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ABSTRACT

A project was conducted in Australia during International Literacy Year (1990) to develop appropriate ratings scales to assess adults' literacy and numeracy skills. Skills were to be measured in the types and levels of literacy and numeracy needed and achieved by adults in society today, including literacy and numeracy skills in the workplace and in daily living. Following a review of definitions and of the literature issues in assessment of literacy and numeracy, the project outlined levels of literacy and provided examples of them. Principles of assessment and reporting were discussed, and an analysis was made of the behaviors that indicate that literacies have been established. Indicators were used in surveys of adults to cover as wide a range of development as possible in each of the types of literacy. They were sorted by selecting those items that an item response model identified as forming a descriptive criterion scale. The indicators were then organized according to their relationship to one another. Matrix sampling enabled the use of a few indicators for each individual, and overlapping sets of indicators were used to map all of them onto a set of scales. For each scale, a pyramid of indicators emerged, with behaviors that almost all people exhibited at the bottom and those that few people exhibited at the top. From these behaviors, a set of competency rating scales emerged from which individual profiles could be developed. Scales were tested and revised as needed. (Appendixes include the project brief; and indicators for literacy (reading and writing) and numeracy (basic operations, measurement, and quantiative information processing). There are 139 references.) (KC)

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ADULT LITERACY AND NUMERACY COMPETENCY SCALES

An International Literacy Year Project

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In 1970, Alvin Toffler predicted that the illiterate of the year 2000 would not necessarily be those who could neither read or write. They would be those who could not learn, unlearn or relearn. How are employees with marginal skills going to survive in an information age?

ADULT LITERACY AND NUMERACY COMPETENCY SCALES

An International Literacy Year Project

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Preface

This has been a particularly rewarding project. Working within the field of adult literacy and numeracy, we have been fortunate to meet many of Australia's adult literacy learners, teachers, tutors, policy makers, academics and other specialists. The project team has had the opportunity to work in educational settings which ranged from schools, TAFE colleges, industry training and workshop settings, to academic environments and public service centres. We have met adults in work, educational and social settings, and we have received help from many people both within Australia and in other countries. Everywhere we have gone in search of data there has been a willingness to participate. In such a project it is not possible to develop scales that will win the approval of everyone and we acknowledge that. Our project has established some new ground and has retread some old territory. Space is restricted in this report and we are unable to name everyone who has participated and thank them publicly. The project owes a great deal to many people.

The project team consisted of Dr. Patrick Griffin, Anne Forwood and Rosemary Jewell. Consultants to the project were Robyn Francis from the Council of Adult Education and Rosie Wickert from the University of Technology (Sydney).

The Steering Committee reflected the spirit and nature of the groups involved in the project and provided advice and direction to the team at critical stages in the project. The diversity of the committee added to the strength of the project. The scope of the project meant that the project staff were constantly meeting deadlines and coordinating large and diverse groups of people. Rosemary Jewell was largely responsible for the success of the coordination of these activities. The project owes a great deal to her efforts. Sue Griffin kept the project office going and provided the important focus for contact. Kitty Swansbra typed the report and helped to finalise the project.

The project initiated major exercises in consultation, survey implementation and data analyses. All were conducted at a national level. The report places the scope of the project in context of both theoretical models of language and of procedures in assessment and is presented in the following sequence. The first section presents an overview of the project and introduces the competency scales. The recent Australian context of adult literacy is examined from an analysis of the proceedings of the annual conferences of the Australian Council of Adult Literacy. Here the concerns change from practical matters related to program delivery at the chalkface in the mid to late seventies, to the economic and political issues associated with Australia's workforce restructuring of the nineties. This set the context for the potential uses of the competency rating scales and was perhaps the driving force for their development. Subsequent sections deal with definitions of literacy and with its assessment. A short discussion of assessment and reporting explains how literacy and numeracy conceptual development is translated into scales according to principles of criterion referenced assessment. The next section outlines the process of developing the scales. This is followed by a report on the limited trials which were possible, and a discussion of issues which arose during the project. An extensive bibliography is presented.

This project was conducted as part of an Australian Government's International Literacy Year (ILY) program. Funding was provided by the Australian Government. The content does not necessarily represent the views of the funding authority.

Steering Committee

Dr. Patrick Griffin, Phillip Institute of Technology — Project Director
Ms. Anne Forwood, Phillip Institute of Technology — Project Team Member
Ms. Rosemary Jewell, Phillip Institute of Technology — Project Team Member
Ms. Robyn Francis, Council of Adult Education — Project Consultant
Mr. Noel Simpson/Ms. Robyn Bergin, Department of Employment, Education and Training
Mr. David Goldsworthy, Division of Further Education

Ms. Sharon Coates, Division of Further Education
Mr. Geoff Burke/Mr. Chris Corbel, Adult Migrant Education Service
Ms. Heather Haughton/Ms. Rosa McKenna, Australian Council of Adult Literacy
Mr. Geoff Sayer, Department of Employment, Education and Training
Ms. Jude Newcombe/Ms. Lyn Hughes, Trades Hall Council
Ms. Margrit Stocker, BHP/Business Council of Australia
Ms. Rosie Wickert, University of Technology, Sydney — Project Consultant
Dr. John Izard, Australian Council of Educational Research — Measurement Specialist
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The Project

The Competency Ratings Scales project coincides with a large range of activities in the field of literacy education and assessment. In a larger context concerns have been raised about Australia's ability as a nation to compete economically with some parts of the population unable to perform simple literacy tasks. Wickert (1989) reported statistics which suggested that significant numbers of adults in the population were unable to read newspaper articles, labels, charts and forms. Miltenyi (1989) focused attention on particular occupations such as machine setters, health workers, and building workers where simple everyday reading and communication tasks in English were beyond significant proportions of the workforce. In an economic climate where restructuring of the workforce has become a national priority, a person's ability to speak, listen, read, write, think critically and enumerate have become crucial skills for adults wishing to enter or remain in an ever changing workforce (Workplace Australia, 1991). In daily and social life, adults are surrounded by print. They are expected to communicate and to negotiate for rights and roles. All of these place reliance on the ability to process information, both text-based and spoken.

With this realisation of the importance of literacy and numeracy comes an urgency to develop programs and use resources appropriately to maximise gains in literacy for Australia's adult population. A clear need has emerged for adult education providers and industry to be able to communicate in a constructive way about literacy needs of adults in a range of contexts. In the area of migrant education a series of scales related to the progress in second language acquisition has existed for some years. These are the Australian Second Language Proficiency Ratings (ASLPR). The scales (or their derivatives) allow a form of consistent communication about English language and numeracy development among adults, including adult migrants with a non-English speaking background. No similar form of communication has been available pertinent to general literacy or numeracy.

Reports of studies of literacy among adults have tended to present percentages related to test items or to specific tasks based on judgement. Through the media the community has been informed of the percentage unable to calculate a tip on a restaurant bill, find the expiry date on a licence, or to select an appropriate paint from a chart. These isolated statistics have been broken down by sub-group in the population so that expectations of ethnic and workforce group performances can be established.

In specific occupational studies, reports have indicated the proportion unable to read safety signs, memos and manuals, rights and responsibilities in the workplace. These issues raise concern about safety, self esteem and productivity. The information consists of isolated facts with no underlying coherent frame of reference to use in interpreting the issue of literacy. This is particularly the case in first language situation. The ASLPR and its derivatives have provided an interpretive framework for second language development. It and its counterpart (The American Council for the Teaching of Foreign Languages (ACTFL)), have been used successfully for many years and enjoy wide acceptance in many countries. They have been used for various purposes including placement, monitoring progress, accreditation, accountability and program evaluation.

A detailed description of progress will also allow a suitable link between practice and theory to be forged. The scales incorporate elements from literature, discussions with practitioners, and from observation of learners in situ. They provide a broad description of progress. They are not an assessment instrument. Instead they are a framework for reporting. The scales are intended to provide a common language for reporting. They are not the actual tool for assessment. This important distinction between assessment and reporting is elaborated upon later in this report. By separating these two processes, and providing a common language the assessors are free to choose any appropriate form of assessment — of adult literacy and numeracy — including self assessment. Assessors are not restricted to the paper and pencil limitations of many tests. However,

test data should be able to be related to the scales, as should a teacher's, trainer's or supervisor's interpretation and an adult's own observation of literacy performance in class, social life or work.

There are numerous concerns that need to be considered in developing assessment scales. Whether one individual is compared with another, or whether such a comparison should occur, continues to be an emotional issue. It is not so much a debate, as there are few arguing in favour of such comparisons. It seems to be more a fear, leading to a constant assertion, that the comparison must not happen. The problem of comparison is one still to be resolved. It is unlikely to ever go away because of the apparent natural tendency to compare in order to make sense of observations (see Griffin and Nix, 1991). Whenever assessments of many are made, the information ***can*** be used for comparisons among individuals. Ratings scales can be used for comparison but they are not designed for that purpose. As Izard (1991) points out it is not the comparison that is the problem but rather the uses that may be made of the comparisons. When it is not clear how a comparison is to be used people become suspicious that the comparison will be used in an inappropriate way.

Personal and social issues such as confidence and self esteem need to be incorporated (Charnley and Jones, 1979) and contextual issues are important (Hill and Parry, 1988). In the UK considerable progress has been made in including these aspects in the Adult Learning and Basic Skills Unit (Holland, 1989) using the informal learning theory defined by Usher and Bryant (1989). Definitions of literacy often focus on both the nature of literacy and on its social and political purposes. However, the purpose of this project was to identify the operational skills that underpin literacy and numeracy.

Consequently, in developing the scales it was necessary to focus on the nature of literacy and the operationalisation of its underpinning skills. The operational component of literacy has been interpreted as competence. This includes the ability to transfer skills from one context to another. The ability to discuss the conceptual bases of literacy and numeracy is also take into account. However the project was expected to follow from Wickert's (1989) application of Kirsch and Jungeblut's study of literacy (1986). Oracy and critical thought or problem solving have not been included in the design of the project as separate dimensions for which scales were to be developed.

This project has focused on the development of a communication medium; a coherence among tasks indicative of developing literacy and a frame of reference to enable interpretation of literacy development across the full range. As such, the project itself represents a natural development in the range of activities emerging in adult literacy in Australia.

The report is set out as follows:

- The membership of the Steering Committee is presented as a part of the preface to the report.
- A short overview of emphases arising at the annual conferences of adult literacy is followed by a discussion of literacy definitions.
- This is followed by a review of issues in assessment of literacy and numeracy.
- Levels of literacy are then outlined and exemplified.
- Principles of assessment and reporting are then discussed.
- These chapters are then linked together in a report on how the scales were developed.
- Finally, issues associated with the use of the scales are discussed.
- As a result of the Project, several recommendations are made in order to facilitate the process of dissemination and adoption. These recommendations appear in Section 9.
- The project brief is appended.
- The scales are also appended as appendices B, C, D, E and F.
- A bibliography is then included.

The Australian Adult Literacy Context

Over the past fifteen years the focus of debate in adult literacy in Australia has expanded. The national forum for discussion of the issues, theories and skills has been the annual Australian Council for Adult Literacy conference. In the first conferences in 1977 and 1978 the topics under discussion related mainly to practical strategies for assisting adults to learn the skills to function in society, within a learning environment designed to accommodate the individual needs of the adult student.

The 1980 conference catered for groups interested in teaching skills, organisation and co-ordination, and issues and information exchange. Important aspects of the program included discussions of adult literacy worldwide, the psycho-linguistic and Language Experience Approaches, Freire's concept of Revolutionary Education, and the work of Smith, Goodman, Chomsky, Piaget, Vygotsky and others. By the mid 1980's, the focus was not only on practice, but the theories underpinning practice were also discussed. The language theories discussed were mainly those of Goodman and Smith and more recently on the genre approach to writing. There was also increased interest in programmes for identified disadvantaged groups, providing access to employment, educational and social opportunities. This was in line with the Governments' principles of social justice. Discussion of language theory was explicit enlarging on the psycholinguistic model and psycho-social models in addition to the language experience approach. Workplace basic education and numeracy were introduced. Throughout this time, growing interest in the work of Freire, and the notion of education as essentially a political process, led some adult literacy theorists to refine the definition of literacy to emphasise the potential for literacy programs to contribute to social democratisation. Vocational literacy had long been one dimension of adult basic education programs. By 1990, with the Australian Government's drive for national industry restructure, and the strong link perceived between improved literacy and increased productivity, adult literacy issues were discussed in the context of the Government's economic, industrial and financial agenda.

Throughout this period the definition of literacy has followed the agenda of the profession. From its early beginnings of practical issues associated with the delivery of instruction in reading and writing skills, it has evolved into the most recent view of literacy as encompassing most language skills, critical thinking, oracy and numeracy. The setting for adult literacy has now been firmly established within the national agenda with the release of the Government's discussion paper on Literacy and Language in Australia. Literacy in the English language has been identified as a necessary basis for everyone to ... "enjoy the benefits of full participation in Australian society" (Dawkins, 1990, p.5).

Definitions

The brief for this project specified that it would develop descriptive criterion scales of Proficiency in Literacy in the areas outlined in the report "No Single Measure" (Wickert, 1989). The three basic scales outlined in "No Single Measure" and again specified in the project brief were Literacy in Prose, Documents and Quantitative areas or domains (see Appendix A). These were based on North American studies by Kirsch and Jungeblut (1986).

In the Wickert study the tasks were selected from those used by North American researchers for the assessment of North American youth between the ages of 16 and 24. The tasks were divided into the areas of Prose, Numeracy and Document processing. Writing was not assessed but its importance was acknowledged in the assessment of literacy. Local adjustments were made to both the items and to the interview process.

The approach was explained as follows:

> It allows for the possibility of developing profiles not only of a person's literacy proficiencies but also of the literacy requirements of, say, particular occupations. And by using and analysing different kinds of literacy tasks at differing levels of complexity as the basis for assessment it allows for an assessment of the influence of a text construction itself as a contributory factor to literacy difficulty and does not assume that the "problem" always resides with the individual. *Above all it acknowledges that to "function" in society is relative to individual needs and thus that different levels and types of literacy need to be identified*, so that profiles of performance can be constructed on the basis of relevant and appropriate assessment tasks (Wickert, 1989, p.4)

This project focused on identifying the types and levels of literacy to which Wickert refers. It does not address the literacy requirements of particular occupations as she recommends. The development of the scales, by assembling descriptors that are unambiguous into sets that describe similar levels of proficiency, is an essential first step. Unless the scales have the appropriate properties and can be interpreted in a consistent way by those who apply them, there is little point in seeking to derive literacy requirements for particular occupations. When scales with the appropriate properties are used, the description of literacy requirements of various occupations can also be interpreted in an unambiguous way. As explained in later sections of this report, the project follows Wickert's advice by "analysing different types of literacy tasks at differing levels of complexity as the basis of assessment" (Wickert, 1989, p.4). The concept of a continuum of literacy and the importance of an underlying theory of literacy has been retained in this project.

Literacy in different contexts is commonly linked to particular goals. The definition presented in the Australian Federal Government's 'Discussion Paper on an Australian Literacy and Language Policy for the 1990's' defines literacy within the goals of the Government's Social Justice Strategy. The Policy states that:

> Australian residents need proficiency in English so that they can enjoy the benefits of full participation in Australian society (p.5)

Literacy was defined as follows:

> Literacy involves the integration of reading, writing, listening, speaking, critical thinking. It includes the cultural knowledge which enables a speaker, writer or reader to recognise and use language appropriate to different social situations. Functional literacy means the ability to read, write, speak and listen well enough to accomplish everyday literacy tasks in our society in different contexts, such as the workplace or the classroom. (p.4)

In the Wickert study, literacy was defined as related to the achievement of individual goals and the development of individual knowledge and potential. It is "using print and written information to function in society" (Wickert, 1989, 4). Her definition was restricted to print

media and, as this project was directed to follow from the national survey, the scales are restricted to print and written information. The focus, in line with the approach taken by Wickert (1989) and Kirsch and Jungeblut (1986), is the identification of those underlying competencies that contribute to the ability to process print and written information.

The project team has deliberately set out to forge a link between the theoretical models in the literature on language and literacy and the observations and intuitions of practitioners in the field. Using the observations of practitioners as the base data, theoretical requirements are imposed via data examination and by consultations with specialists.

The literature provides many different definitions of literacy and many different contexts in which the word literacy is used. However, two things are clear. First, literacy is not a neutral term and second there are no precise operational definitions of the term. Because there will probably not be a generally agreed definition of literacy, there will probably not be a generally agreed way of measuring literacy.

The definitions outlined above represent examples of both component and omnibus definitions of literacy. The omnibus definition includes all aspects of oracy, language and numeracy. Definitions like these lead to operational difficulties and in communications about competencies or expectations with respect to literacy. The distinction between conceptual and operational components becomes even more confused when social and political agendas underpin these omnibus definitions. Definitions like these have, in the past, led to difficulties in other areas of human assessment and may encourage an equivalent of the psychometric search for the g-factor in the sixties. For this reason and others discussed above the definition of literacy used in this study has been restricted to the ability to process text-based information. The purpose of literacy and its cultural connotations are treated as separate matters.

The idea of "functional literacy" suggests that non-functional literacy exists. "Survival literacy" suggests that there is a non-survival literacy. The use of the term "marginal literacy" suggests that there is a margin in which a person can exist outside the mainstream of literacy in society. Each of the terms suggests that there is a point at which a person transforms from one classification to the other. That is, an individual can move from being illiterate to literate; from being non-functional to functional; from non-survival to survival or from the margins to the mainstream. What are the criteria for these transformations to take place and how can the individual's changed status be recognised? These are "hard" dichotomies or classifications of data that are, in reality, "fuzzy" or "soft". Dichotomous classifications impose an artificial separation where the real world is not so distinct. However, literacy and numeracy are constructs which can be described in terms of competencies which reflect a continuum or a set of continua of increasing proficiency. Employing many categories or a polychotomous classification may have a less distorting effect on the description. Moreover it enables a description of increasing proficiency to be described in probabilistic terms. That is, if an individual could be described in terms of a three level scale, illiterate, marginally literate and literate, then one placed after marginally literate level could probably undertake successfully, tasks which could not be undertaken successfully by one who was at the level defined as illiterate. But the project has not used these labels. Instead, nine or more levels are used and an underlying implicational relationship assumed between levels on each of the scales.

In 1978 UNESCO defined a functionally literate person as one who can engage in all those activities in which literacy is required. There is a circular quality within this definition; "a person is functionally literate if they can function within their community". Such definitions are very difficult to operationalise. The concept of functional literacy is relative. It depends upon a premise that the knowledge needed by an individual to cope cannot be defined in absolute terms. This knowledge is instead a function of the demands on an individual at a particular point in time.

Functional literacy as a term has been used in recent years to characterise problems of reading and writing found particularly in developed or industrialised countries. Therein lies a difficulty with the concept of functional literacy. It is context dependent. The more the requirements of

our society rise because of increasing complexity of technological advances, so too do literacy requirements. This definition characterises problems or deficits and which are very context dependent, because this is true of literacy per se.

A cultural basis of literacy is consistent with the ideas of Venezky (1986). Ideological models (Street, 1984) and context free models have been largely avoided although the appearance of the scales may suggest that Ong's (1982) context free perception of literacy has influenced their development. The context of text is considered important. Holland (1989) argues that in an ideological model text is viewed as context dependent.

Street (1984) described two contrasting models of literacy. An autonomous model is a view that readers are independent of their experience. It tends to hide the user's ideology behind the use of technically neutral language. Its implications are pragmatic and involve standardised tests which appear to permit comparisons of results based on an ideological model which gives the appearance of being independent of cultural differences. All of these influences impinge on literacy programs and their presence is important. The processes adopted in this project allowed these influences to impinge on the development of the scales.

Literacy programs are important. There are basic education programs in schools, colleges, tertiary institutions, in further education establishments and in the workplace. There are programs for workers, students, parents, and for social groups. The existence of these courses indicates concern in our society about a general lack of literacy, whatever is meant by the term. People are described as high or low in literacy or advanced in literacy. The notion of levels of literacy is emerging. The term literate now seems to describe a person who is above a minimum level of some quality rather than an upper or advanced level. Literacy programs are designed to help individuals reach a minimal level of skill that can be used to describe an individual as literate.

Venezky (1990) suggests that literacy requires a set of skills for processing reading and writing rather than a set of social skills that enable a person to cope or in fact to deceive and avoid detection as lacking in literacy skills. There are many individual cases of persons who have become very successful in business and society without reading and writing skills. These individuals usually employ others to read for them and they avoid circumstances in which they must read. In many cases individuals with highly developed entrepreneurial skills create a culture in which they are not required to use these skills. In other cases, individuals may even go as far as deceit and avoidance in order to escape detection as a non-reader. Cases such as these are common.

It is also possible to incorporate the work of Mikulecky (1985) on task context and functional literacy, and the work of Guthrie (1988) and Guthrie and Kirsch (1987), who have examined the consequences of differences in school and academic reading and functional reading. These, together with the psycholinguistic model of reading and writing can provide a basis on which to build a continuum of literacy. In addition to this, analyses of the literature devoted to systemic linguistics after the work of Halliday (1985), Christie (1990), Martin (1986), Kress (1982) among others provides insights into the influence of genre on the development of literacy. The publication edited by Christie (1990) provides examples of indicative behaviours that could be used to illustrate increasing competencies in adult literacy and numeracy. Consequently there is a wide range of potential theoretical resources on which to base an empirical study of literacy levels. The project has also focused on the observations of practitioners in adult education over a wide range of literacy.

Given the necessity of following from the Wickert (1989) study, the concepts of literacy and numeracy have been adapted to incorporate many of the issues discussed above. Literacy is considered to be the ability to process written information to function in society, achieve goals and realise potential.

Numeracy is not included in this definition. However it has been defined by paraphrasing the above definition and extending it to include basic mathematics. Numeracy is defined more fully in a subsequent section.

Assessing Literacy and Numeracy

To assess literacy as the ability to process text-based information via a study of reading and/or writing in total isolation from the other accepted modes of language — talking and listening — would be inappropriate. Over the past 20 years or so there have been some fundamental developments in our understanding of what's involved in learning to read and write. It may help to review some of the changes in order to see how language development models are implicit in the competency scales.

Initially, psychologists exclusively looked at reading as a perceptual process of de-coding print. Later, linguists suggested that there were other elements to consider in learning to read, so there was a move away from concentration on the visual characteristics of words towards the use of the learner's knowledge and experience of speech as a basis for learning to read. This became known as the "Language Experience Approach". Because it stressed the first-hand experiences and personal interests as motivating forces in helping to develop reading and writing skills, it has been described as conceptually, ideologically and theoretically sound (Wickert, 1985).

In the 1960's and 1970's, psycho-linguistic research focused on bringing together what was known about how language was acquired, in order to consider how people learned to read. Goodman (1976) and his associates referred to the process of learning to read as a "psycholinguistic guessing game". Adults are assisted in this process because they have a great deal of language knowledge and experience of life to bring to bear on the process of reading. Miscue-analysis, or the study of oral reading behaviour, became the basis of a whole new way of thinking about what was involved in learning to read. Smith (1985) proposed that as people learnt to talk by talking, so they learn to read by reading. He argued that making reading easy was not a process of breaking down the reading process into component parts, or presenting the reader with contrived or over-simplified pieces of text. Also in the seventies, Halliday (1978) introduced the genre basis of language development. Genre or type of text can influence the meaning of words, or set the context for building meaning. The systemic linguistic approach based largely on Halliday's work is growing in influence.

The Psycholinguistic model of reading consisted of four basic steps (which good readers perform unconsciously). Readers *sample* the text, *predict* the meaning, *confirm* meaning from their experience, and then *integrate* that meaning into their overall knowledge. Poor readers need to be shown how this process can be used, and then how to develop those skills to a high level of proficiency.

Sampling allows a reader to select what print to process until they can predict meaning. Sampling can also be the process of identifying key words in a passage and building the meaning from a sample of key words or phrases.

Predicting is a process of anticipating what a text will say. It is the process by which the reader infers what an author knows and reduces the number of alternatives to be dealt with. Predicting is dependent on the amount of experience and knowledge that a person already possesses. Consequently, prediction is a powerful tool as it quickly reduces the amount of print needed to be processed in order to obtain meaning. The more familiar a reader becomes with a range of registers, genres and modes of textual structuring, the better the reader is at using that background knowledge to predict meaning. The reader uses three kinds of cueing systems to establish meaning.

1. *Semantic cues:* The reader uses knowledge and experience to predict events, phrases, and words, and to make sense of the text based on the context, genre and text type.

2. *Syntactic cues* (structure): With these, the reader draws on knowledge and experience of patterns in speech and written language to predict the meaning.

3. *Graphophonic cues* (print): In these, the reader uses knowledge and experience of the relationship between sounds and symbols to predict particular words. This cuing system has recently received a great deal of attention.

Using phonics only teaches people to say words rather than to "read" them. That is, to attach meaning to the word. Phonics approaches in English can lead to mispronunciation. The addition of syntactic and contextual cuing systems can then help to establish meaning even if the reader can not pronounce it.

Given the proportion of the Australian population estimated to have literacy problems (Wickert, 1989), attention has focused on schools and reading programs. Phonics-based reading strategies have been proposed as a potential solution to literacy deficits in Australia and in the United Kingdom. This overview of the reading process shows that phonics or using graphophonic cuing systems forms just one strategy. To focus on only one may not be successful. It could be analogous to teaching children to dance by perfecting the movement of the left foot only. They may learn to dance because the rest of the body will act accordingly.

Confirming answers the questions posed by the reader when predicting. Good readers read to confirm their prediction, moving on if the prediction is correct. If not, the reader will usually stop and try to determine what was wrong. Good readers confirm spontaneously. Because poor readers do not make predictions, they fail to read purposefully or to confirm. If they predict without confirming they risk misunderstanding.

Integration is the final step in the process of comprehension. Readers integrate new information from their reading with what they already know. Meyer and Keefe (1990) describe this as consistent with the Piagetian theory of learning, using the words "assimilation" and "accommodation" to describe the same process (Ginsburg and Opper, 1969).

Growth in Proficiency/Competence

Proficient readers apply a combination of strategies in order to read so the process is a cycle; sampling the text, predicting the meaning, confirming the meaning, and correcting the meaning based on experience.

People exist in a world where literacy demands are ever-increasing, deciding what to read and what not to read depending upon individual needs and interests. Often, print is purely of a functional kind, e.g. signs in the supermarket, bus time-tables, television and newspaper advertisements. The inexperienced reader builds a repertoire of known text types. Oh each occasion that a familiar text type is encountered the reader is less dependent on the text. There is an increasing inclination to predict. More experienced readers develop an understanding of different jargon, different styles, and an increasing number of different types of text. Still more experienced readers become aware of the writer's motivation, and enter into a more critical interaction with the text. The developing reader plays an increasingly autonomous role understanding the interactions of graphics, or pictures in text, taking risks with print by making guesses based on the cues of semantic, syntactic and graphophonic systems. The readers' strategies and language cues begin to mesh.

Most beginning readers move from sub-vocalising the words to a stage where the words become thoughts in their heads, and the rate of reading increases. At about that time, readers still need some support and they need time to practise reading. As readers become more fluent and experienced, and encounter a much wider range of reading demands, they may be willing to take on more extended and more challenging texts over a much wider range of genres. Illustrations become less important in supporting understanding. They become more critical of what they read and of what writers have to say. They are more able to question or appreciate aspects of content, form and function of the text. They come to realise elements of prejudice, bias and different levels of meaning, detecting elements like ambiguity and irony in the writing. Their reading will develop to a level which enables them to overcome weaknesses in the text. Developing readers initially move from a dependent state to an independent state. As they become more proficient and confident, they tackle familiar texts, and then less familiar texts.

The Scales

The scales provide a base for thinking about a reader's progress across a range of developing skills and increasing proficiency, confidence, independence and fluency in reading. They offer ways of describing what a reader can do to become fluent. The scales can also be used to identify readers who are having difficulties.

It is reasonable to expect that there will be other indicators of literacy or indicative behaviour that can be used to chart development, and it is important that these signs or indicators are noted. There will be instances when a reader seems to be moving from one set of indicators to another. That kind of information should be recorded where appropriate. There will be instances when the reader tends to be developing at more than one level and that should also be recorded. At times there may be an appearance of regression, particularly when a new register, style, context, or genre is encountered, and the lack of experience, knowledge, and confidence, to tackle, guess, and to use the language cues to predict the meaning of the text influences comprehension. Some analysis of why the regression is taking place should be undertaken, because it is within this analysis that assistance can be offered to the individual. Adaptation of running records and miscue-analyses or other informal assessment techniques can help instructors identify the kinds of reading strategies and the reading developments that are taking place, and enable an interviewer or an assessor to place a reader along the scales with greater accuracy.

Over a period of time, it will be possible to observe reading of different kinds of text, poems, comics, magazines, newspapers, instructions and so on. They may be observed filling out forms or reading explanations of a mathematical problem or a concept, reports on scientific topics, computer manuals or textbooks. But, they will not read equally well across the full range. At different times they will need to read more in one area than another, and will develop preferences and special interests within the range of reading experiences. It is important however, that in time the reader is given every opportunity with as diverse a range of materials as possible to develop their linguistic cueing systems and their reading strategies.

The scales describe growing fluency, independence and experience in reading. They describe how readers increase in sophistication to the point where they become aware of all of the nuances of texts, and are able to apply these in as broad a range of genre as is applicable in their particular setting. They are also able to read and master new and previously unencountered reading materials. Their control of the reading process can develop to the level at which they can overcome deficiencies in the text and lack of experience or familiarity with a register or genre.

One of the reasons that some adults have difficulty reading is that they may not understand the process because they have not learnt to read for meaning. Some adults may regard reading as a product, the end result of identifying and sounding out every word. Some readers may believe that they would be better readers if they could only break down the familiar words into the sound segments. That is, they may equate phonics with reading. These readers have been described as "phonics bound" (Meyer and Keefe 1990). Other readers with difficulties might regard identifying each word as reading. Meyer and Keefe described these readers as being "word-bound". Both kinds of readers have problems because they have a mistaken notion of the purpose of reading. They need to learn that reading is a search for meaning. Adult beginning readers may have to be taught that the goal of reading is to make sense of print. Their development as readers will depend upon their ability to think before they see, and to predict before they make meaning. Reading is more a process of interacting with text. In the development of reading the application of thinking becomes more extensive as the level of proficiency increases. This is reflected in the development of the reading scale. The intellectual activity associated with reading becomes more accentuated as the reader becomes more proficient.

Developing as a writer

In developing writing skills, individuals draw on their distinct language resources and knowledge of the spoken and written language, and of print.

1. Knowledge of the Spoken Language

Spoken language is the first and most important resource that a writer has. It is the foundation for all later understanding of written language systems. This is why it is considered important to support the first language of bi-lingual learners. Spoken language is adequate as a foundation for written language development. Initially, it will be normal and even desirable for written language to follow the patterns of speech and even for dialect forms of writing to appear. In learning to write, individuals are encouraged to dictate and to transcribe speech. The more proficient a writer becomes the greater the difference between spoken and written language. As learners read more, and as the linguistic range increases, they will begin to make more confident use of written forms of language.

2. Knowledge of Written Language

Halliday (1985) shows that spoken language is grammatically complex and written language is lexically complex. Most adults will have considerable experience with written language, even before they can write. General exposure to print will enable "copying" and an understanding of the link between "text" and communication. Developing as a writer involves developing as a communicator rather than just developing the psychomotor skill of writing.

3. Knowledge of Print

The world contains so much print that almost everyone is exposed to print in some form. Television presents a large amount of print. The existence of print in the environment can become an important influence on writing as well as reading. Exposure to a large range of print-types can lead to knowledge of the link between the type of print and the message being conveyed.

Just as reading develops from a dependence state to an independent state, so too does writing. The initial help or support from another person can gradually be withdrawn as the adult takes more and more control of the process.

Writing is not one single process. Smith divided writing into two parts, compositional and transcriptional. The compositional part consists of getting ideas, selecting words, and grammar - the rules for putting it together. The transcriptional part consists of the writing, the spelling, the capitalisation, punctuation, paragraphs, legibility, lay-out and presentation. People can compose long before they can transcribe. Most of the problems connected with learning to write are problems to do with transcription, and most of the approaches of teaching and writing have been ways of dealing with transcription.

Christie (1990) describes the process approach as a conduit model which has a role of carrying information and meaning. A second model views language as a symbolic system, or one of a number of symbolic systems, which are used to build meaning. The difference centres on whether writing conveys or builds meaning. Both argue that language and meaning are inseparable. Christie argues that if language is seen as a means of conveying meaning, this may in fact turn attention away from the manner in which language patterns are built to organise and shape meaning. Setting the genre and process models in antithesis may be counter productive for practitioners. McCormack and Pancini (1990) show how the two approaches to writing can be complementary.

Progress in the development of writing skills needs to be seen as multi-faceted. There will be progress in the area of composition and in the area of transcription. As composition skills develop there is increasing control of the development of meaning, confidence, and the development of the writer's awareness of the audience and how the text should match the reader's needs, familiarity with language structures, range of "types" of writing, and an ability to write more extended material.

The transcriptional aspects should develop increasing control of things like spelling, punctuation and layout of the text, better control of handwriting, and the development of a personal style of writing. In addition, the writer becomes aware of the match between the writing style and the purpose of writing. Making lists, taking notes, keeping logs and journals, formulating questions, preparing a report, writing a script, making a newspaper or magazine article, writing an editorial, preparing a speech, writing personal letters or business letters, writing instructions, a handbook or a manual, mixing writing with diagrams, charts, graphs, pictures or captions can all become part of the writer's repertoire.

Apart from the functional approach to writing, and being aware of the purpose of writing, there is a place for learning to write for the satisfaction of the process. Having something to say and the ability to write that down can be a most satisfying end result. Development in writing may depend on a writer feeling this kind of involvement. Developing an understanding of the structures of written language, it's conventions of spelling, punctuation, layout, and presentation all tend to indicate that growth and development as a writer is taking place. Observations of the writer could focus on the pleasure and interest in writing, the range and variety of writing, independence and confidence exhibited when writing.

Numeracy

There is general consensus among those in the literacy field that at least basic competence in numeracy is required for functional literacy. However, there is again no agreement about how much numeracy is required nor for that matter which basic numeracy skills are required. The ability to process quantitative information is later discussed on a register-based view of numeracy. Linking this to the ability to operationalise the concepts leads to a notion of developing competencies. In addition numeracy is argued to include the ability to perform mathematics operations in domains of basic arithmetic and related everyday applications. These have been interpreted as basic operations and measurement for the purpose of developing the competency scales. For this reason this section begins with a discussion of what numeracy has been taken to mean for the purposes of this project.

Although numeracy is now consistently being identified as a component of literacy, few attempts to operationalise this definition have been made. Two aspects of numeracy have emerged in discussions of literacy and numeracy. One concerns the understanding of the terminology or register of mathematics and the other appears to be concerned with the ability to perform mathematics operations. Both can be included in a definition of literacy, but some distinction needs to be made as to which is being referenced.

Taking the operational aspect beyond the basic operations and number systems is far too complicated and specialised to be included in a definition of literacy. It may be that higher levels of numeracy and ability to demonstrate specific mathematical skills become part of the repertoire of performance of people who also exhibit higher levels of literacy. The skills which could be demonstrated include basic addition and subtraction, comparisons, dates and time.

The link between mathematics skills and literacy was demonstrated by Kirsch and Jungeblut (1986) who defined Quantitative Literacy tasks as those which involve the knowledge and skills needed to apply arithmetic operations, either alone or sequentially, that are embedded in printed materials such as balancing a cheque book, figuring out a tip, completing an order form or determining the amount of interest from a loan advertisement. An analysis of the development of control over the register of mathematics and its text-bound presentation has led Chapman and Lee (1990) and Lemke (1988) to challenge the assumptions of the sharp distinctions between numeracy and literacy. They argued that the separation of numeracy and literacy as unrelated skills has been reinforced in formal education systems by having the separate subjects of Mathematics and English. This they argue has been inappropriate because literacy involves a series of competencies which necessarily encompass numeracy. Text in content areas (of which mathematics is one), necessitates the reader learning to engage the register of that content area.

Hence the concepts of numeracy have to be understood when the reader attempts to comprehend text containing quantitative information. However a distinction needs to be made between the ability to comprehend text containing quantitative information and the ability to perform the mathematical operations which may be needed to solve specific numerical problems.

This implies the existence of at least two types of numeracy and for every type there is a need to identify enabling and prerequisite skills. Hence, just as for the more global definition of literacy outlined earlier, there appears to be both levels and types of numeracy.

It is also possible to see numeracy in Green's (1988) classification of operational, cultural and critical modes. In the operational dimension, there are the skills and competencies that are taught and learned in the mathematics classroom. The cultural dimension involves the immediate context and the demands it places on the individual to use the operational skills. The critical dimension involves the individual's awareness of different kinds of socialisation that allows reflection on the interpretation of the content. All three are interrelated. For instance the reader must transform the information from tables, graphs and diagrams into a verbal form in order to confirm the meaning, integrate it into the knowledge base, use the information and make decisions, quite apart from the necessity to assimilate the knowledge and reflect upon its importance or relevance.

Development of proficiency in mathematics involves the generalised use of mathematics in contexts other than, and in addition to, the classroom. This is not to say that the classroom skills are neither important nor necessary. The development of numeracy could be couched in terms of the development of proficiency in mathematical skills where proficiency refers to the capacity to transfer and apply what has been learned in one context into new contexts. This may even be applied to the text processing skills involved in developing literacy.

Such an interpretation is consistent with general interpretations of what numeracy means. People are considered to be numerate if they have a range of mathematics skills or if they have studied higher levels of mathematics. The weakness of this approach is however that numeracy can become identified with a syllabus studied rather than a set of competencies that can be applied in a range of contexts. It is the range of contexts that links the skills of reading and writing with numeracy. The ability to decide which skill to use, or which competency has been used and then to process information and make decisions may involve a large range of language skills regardless of the fact that the skills may be mathematical in their origin. As technology demands more of individuals in society, more is demanded of their ability to process quantitative information and make decisions based on that information. This appears to be based on the knowledge of the mathematics register — the verbal component of mathematics. Kirsch and Jungeblut did not survey adults from the verbal-numeracy standpoint — nor did Wickert. Clearly, the notion that numeracy is only about dealing with the verbal language of mathematics cannot be completely supported given the tendency of quantitative information to be transmitted in such a variety of means, including the symbolic registers of mathematics.

In many non-mathematical areas, mathematical terms, concepts and even operations are presented directly and indirectly in the text. Lemke (1988) has shown that these can be considered to be part of the semantic, thematic and generic systems of the text. Under these circumstances the reading strategies and the reading process, are brought to bear on the task of making meaning of the text, with its mathematical concepts embedded in it. This means that the reader needs to reference the language of mathematics in order to make meaning. Halliday (1978) called this set of meanings (rather than the language itself) the register of mathematics. He demonstrated that the language of mathematics draws on a range of language types, redefines existing words, coins new ones and develops a degree of what he called nominalisation (p.195). The notion of register is useful because it allows the examination of the purity of meaning of specific mathematical words in the language. Indeed, new meanings of old words can be found when the mathematics register is "applied" to even sample words like 'add', 'less', 'more', and then to more technical terms such as 'correlation', 'gradient', 'classification' and so on. These issues

have been extensively discussed by the Department of Further Education (1989). Because many mathematical words have been taken from other fields, their level of "technicality" and abstraction (and hence meaning) may vary from context to context. Increasing proficiency in numeracy will mean that an individual's control over the meaning-in-context will develop as the individual develops increasing control of a range of register. This will certainly be assisted by increasing control of mathematical skills. The ability to access, control and to choose from a range of registers increases the individual's ability to understand what a text is signalling and to define the purpose of the information and decision making that is aligned with it. This is true of course for all areas, not just numeracy. This process of confirming and integrating meaning into existing knowledge bases is consistent with the process of reading comprehension and lends support to the inclusion of this form of numeracy in definitions of literacy.

However, there are other aspects of numeracy incorporating the capacity to perform the mathematical operations which underpin the concepts. A numerate person may be justifiably taken to mean one who can perform at least basic arithmetic operations on basic number systems in a restricted range of contexts. The more proficient a person becomes in numeracy, the more skills and concepts that person can transfer from one context to another. In order to assess overall proficiency there is also a need to monitor the transfer of skills across contextual boundaries. The two major components (operationalising the skills and understanding the concepts) need to be distinguished in discussions of numeracy and literacy. One component could be considered to be *mathematical literacy* and the other could be defined as *mathematical competency*. The former is defined for this project as the ability to understand the concepts and register of mathematics and the latter as the ability to apply the processes of mathematics. The latter is taken to be more in keeping with the usual understandings of numeracy. To use an analogy, a person could be considered to be literate in a particular sport (say basketball) by being able to understand the register of the sport, write about it, read and understand the literature on the finer details of its development and improvement and even advise players. This could all be done by a person who had never played the sport and may not have the ability to ever play. This person could not be considered to be technically competent in the sport. In numeracy the same distinction has to be made. A person may understand the register of several types of mathematics and be able to discuss quantitative information in several contexts without being able to perform the processes of the mathematics being discussed. Such a person could be argued to be mathematically literate but not technically competent. Numeracy has to involve the two components and the ability to perform the processes necessarily requires literacy in the appropriate register. This applies to any technical field. An increasing development of numeracy also requires the application and comprehension across a range of contexts. Discussions of mathematics literacy have been provided by Helm and Marr (1990) and Willis (1990).

This leads to a dilemma in assessing numeracy. Does the assessment focus on the skills in a range of contexts or on the skills in the immediate context of the individual, providing it is outside the classroom and that the skills have not been directly taught? Alternatively, does the assessment focus on the context-by-stimulus-by-skills interaction that can be achieved in a test item? Kirsch and Jungeblut (1986) used simulation tasks which were sufficiently general that transfer was assumed. The assumption was strengthened by the evidence of their analysis. A single underlying dimension was demonstrated, illustrating that the tasks formed a cohesive set. This is generally taken as evidence for internal validity.

It is possible to focus on the numeracy demands made on readers, given that quantitative information can be presented in textual contexts or in tasks to be performed in non-text situations. There are also many numeracy demands made on readers in non-mathematical situations. These situations call on the individual to use different ways of thinking (using the language or registers) to deal with these situations.

Increasing proficiency in numeracy will mean that an individual's control over the meaning-in-context will develop as the individual has increasing control of a range of registers.

This will certainly be assisted by increasing control of mathematical skill. The ability to access, control and to choose from a range of registers increases the individual's ability to understand what a text is signalling and to define the purpose of the information and decision making that is aligned with it.

This explanation of increasing proficiency in numeracy can be applied to reading and writing, by changing two words:

Increasing proficiency in *literacy* will mean that an individual's control over the meaning-in-context will develop as the individual develops increasing control of a range of registers. This will certainly be assisted by increasing control of *language* skill. The ability to access, control and to choose from a range of registers increases the individual's ability to understand what a text is signalling and to define the purpose of the information and decision making that is aligned with it.

A certain degree of control of language skill may be necessary for an individual to be able to exercise any control over the meaning-in-context. The learning strategies employed in order to acquire this minimal degree of control of language skill are essentially those based on the language experience and psycholinguistic models.

> Numeracy has been defined for this study as the ability to process quantitative information and to apply basic arithmetic and other mathematical operations. An increasing ability to process, apply and reflect upon quantitative information in a range of contexts represents the development of numeracy.
>
> Increasing proficiency can be described by discrete competencies, which engage a progressively increasing control of mathematics operations and understanding both within and outside the context in which the operation was initially learned.

Hence the project has established scales which describe the progressive development of skills in processing quantitative information, in the application of basic mathematical operations, and in performing measurement operations.

Types of Literacy

Reading (Prose Literacy)

The demands of the workplace environment for highly specific tasks to be performed may move workplace basic education towards a task-driven education in which specific tasks are learned rather than generic language competencies. For those unable to read materials from a wide variety of texts, the information they can use and the skills they apply, or can be trained to apply, have had to become very narrow and very highly focussed. These people need to be trained in processing information for highly specific tasks. Many of these tasks presume some very basic reading skills. However the social, economic and political contexts in Australia now require the workforce to be much more flexible. This in time requires individuals to have generic reading skills to a level which enables independent learning. Hence there is a tension between the need for sufficient literacy for a specific job and sufficient literacy to support flexibility in the workforce. Such a basis for literacy is closest to the notion of Prose Literacy but would need to be extended to include continuous Prose in many contexts.

"Prose Literacy tasks involve the knowledge and skills needed to understand and use information from texts that include editorials, news stories, poems and fiction." (Kirsch & Jungeblut, 1986).

Document Processing

"Document Literacy tasks involve the knowledge and skills required to locate and use information contained in job applications or payroll forms, transportation schedules, maps, tables and indexes." (Kirsch and Jungeblut, 1986). This has been a very difficult area to define in a way that enabled an empirical analysis for this study. Kirsch and Jungeblut's study is the predominate

study which introduced document processing as a component of literacy. The correlations found in Australia between this literacy scale and those based on the reading and comprehension of extended discourse (or Prose) (Wickert, 1989), indicate that document processing may make an independent contribution to literacy development. Alternatively, document processing may be a sub skill of reading or of numeracy or of both. So the low correlations in the Wickert (1989) study may be an artefact of mixing restricted range components of two scales and then trying to correlate the scale to each. In other words the internal validity of the scales and the studies may be problematic and attempts to interpret the correlations may be misleading. Document processing has been limited to the ability to deal with different types of document formats such as job applications, TV time tables, advertisements, labels and so on.

Writing

Much of the cognitive research related to writing focuses on the componential theory of intelligence proposed by Sternberg (1980), which identifies the elements of performance to do with strategies and plans. For example, in the area of writing instruction, there is a fundamental shift from analysis of written products to the focus on the interconnecting process of thinking, learning and writing (Hayes and Flower, 1986). In the socio-cognitive approach taken by Nystrand (1982) the process of writing is one of negotiating understandings and meanings between writer and reader. In describing a scale of language competence, the identification of these "metacognitive" elements, those of the problem solving kind, is essential for a full and accurate representation of what happens when adults write. The development of compositional and transcriptional abilities leads to increasing competence in building and conveying meaning. Hence writing fits within the ambit of the definition reference to processing text based information.

Quantitative Literacy

For this project Quantitative Literacy has been interpreted as numeracy. As such, the discussion of numeracy outlines the position taken by the project team.

The Combined Skills

Not all of the skill areas play an equal role or are they all equally important. Venezky, Wagner and Ciliberti (1990) argue that, while reading is primary to any definition of literacy, the other skills are secondary. Writing as a means of recording and communicating pre supposes reading. Otherwise it is a mechanical copying task. Reading pre supposes comprehension otherwise it is recognition and or recitation. Numeracy and document processing are supplementary to reading and have no role in literacy without it.

A skilled reader who has little numeracy skills and who does not know much about the format of the documents will still be able to get significant amounts of information from print. On the other hand persons specifically trained to complete particular forms and to place quantitative and/or verbal information on those forms, may still stumble in an environment which requires different skills in print and may not have the literacy skills to move from one environment or task to another.

In adult basic education the major concern is with those who do not read or whose skill level is below levels E or F on the reading scale. These individuals will need additional assistance in the fields of numeracy, writing and document processing (if the latter is a separate and discrete skill). Rather than concentrating on specific tasks, there is a need to consider the skills that enable the tasks to be performed, and the psychological and cognitive skills and competencies that underpin those tasks. This is particularly true in the Australian context where workplace flexibility and independent job training has become a lynch pin of workforce reform.

Rather than examining the concept of literacy from the perspective of the global skills described above, Kirsch and Jungeblut (1986) included four types of skills which are now generally included in definitions of literacy. These are *Prose*, *Writing*, *Quantitative* and *Document processing*.

Generally there is no argument about the inclusion of reading in the definition of literacy. Although there is no agreement about what constitutes the basic or minimal level of competency in reading, there is, however, a tendency to compare the types of skills a person has with the types of skills that are expected of a person in a particular context in the community or in employment, and a tendency to label people on the basis of such perceptions.

Levels of Literacy

Venezky, Wagner and Ciliberti (1990) argue that there are two fundamental levels of literacy — basic and required literacy. Basic literacy has connotations of minimal levels that are necessary for self sustained development. It is the acquisition of a set of basic skills which enables an individual to gain access to a culture. This might be called the access level.

Their notion of required literacy encompassed the set of skills that are necessary in a given social context and may change over time. When the individual moves into a particular social context, (such as in the workplace), more specific competencies may be needed. For example, one might want to become the secretary of a local sporting club, or to work in a particular job. These may incorporate the language, numeracy and other information processing skills in varying degrees. However, adults who have not acquired the language skills during their academic education at school, are unlikely to be able to be taught those generic competencies in the workplace if the same teaching procedures are used.

Grey (1956) indicated that there could be a third level of literacy. They discussed the notion of an individual developing literacy to a point where they could control and improve their quality of life. Perhaps this is the basis for empowerment. It may not occur until individuals proceed past the access and required levels to a level where they are able to set the parameters on what literacy skills are required. In other settings, it is the context, the work environment, the task and other people who set the requirements. When individuals have the skills to improve their own life, they are able to set the parameters themselves.

Given that levels of literacy exist, it is appropriate to pursue Glaser's definition of criterion scales (Haertel, 1985). That is, we can define progressions of increasing proficiency within the different types of literacy and numeracy. We do not however need to confine the precise definitions of the three levels above. A scale covering those arbitrary levels may be more useful if it were divided into a larger number of levels each indicating progress along a continuum or along a range of continua.

The notion of a continuum of literacy skills does not enable classification of people into categories of "literate and illiterate". Kirsch and Guthrie (1981) argued that "it seems more appropriate to represent functional literacy as continuously distributed with various points along a continuum indicating different levels of functioning". In the Kirsch and Jungeblut study (1986) the continuum was defined by the content of a series of test items. Levels on that continuum were defined by the test scores and by the content of test items placed along the continuum.

In this project, the concept of a continuum of literacy has been defined more in terms of its social, community, educational and functional importance than on a basis of a test score interpretation. Observations of practitioners were supplemented by literature sources to establish a database for the development of the scales.

Despite the diversity of definitions, the unifying basis of the literature appears to be that functional literacy is dependent on the ability to process relatively small, not necessarily connected amounts of text, and on the ability to apply the information to a practical situation. Hence the continuum of literacy can be defined in terms of both cognitive skills, whether identified through observation or through specially devised tasks (i.e. test items or performance tasks), and applications of criteria to decision making by those making observations, or interpreting success on sample tasks. It is on this basis that Jones (1990) used the Young America Adult Literacy Survey items to develop the literacy competency scales for Canada.

Jones (1990) claims that the levels are not points derived from test scores. The levels were defined before the Canadian tests. Unlike the American scale for reading, the Canadian scales do not identify points or scores on the continuum. Instead, they have identified broad levels or bands. (This is an important difference to the approach of the American study, and one which is quite compatible with the work done here in Australia). It meant that in the Canadian context,

items were selected to test skills at the predefined levels. However, because functional literacy was assumed to be a continuum, even a group of individuals within a level on the scale would have a range of skills. Their allocation to a level would not only depend upon the performance on a literacy task but also on the interpretations of observers who make decisions on the level at which an individual may be placed.

The Australian project adopted an empirical approach to the identification of levels of literacy. It is based on collaboration with practitioners whose knowledge of literacy and numeracy was an important factor in defining the scale content. Practitioners, in a series of workshops, provided descriptions of competencies which could be used to develop the progressive scales of literacy and numeracy. This provided part of the data base and literature on adult literacy and numeracy was used to supplement and refined the descriptions. Consultations with theoreticians and policy makers also enabled the data to be shaped by theory and by policy. It therefore offered the opportunity to practitioners, theoreticians and policy makers, to influence the way in which the scales are determined, developed and expressed. Those who took the opportunity, were in a position to help define the underlying continuum of literacy. The project therefore used the specialist knowledge base in the field of adult literacy to define the scales. The approach made great demands on participants and the attrition rate reflected the time demands made on them as a group. Participation rates are reported in a later section of this report.

Many adult basic education practitioners who participated in the project commented that they found the upper levels of the draft scales of little relevance to their students because their students' skill levels were too low. Most of their students were beginning readers. Similar comment was not made by others involved with students at higher levels of literacy.

The literature on systemic linguistics provided a large list of indicators of literacy which were included in the initial survey checklists. Many of these indicators were eliminated during the empirical analysis. Although competencies related to the management of register and genre are in evidence in the scales, it appears that practitioners do not have a consistent interpretation of behaviours described in the terminology of systemic linguistics. This lack of consistent interpretation meant that many potentially useful indicators could not be included. One explanation for the varied interpretation (by so many participating adult basic education practitioners) of genre-based indicators may be that the students on whom they were trialing the draft scales had not yet attained a level at which control over register was a major focus of the learning approach. These students may still be at the stage of attaining minimal control of reading and writing skills. The lack of fit of systemic linguistic indicators to the data may also suggest that genre may be domain or context-dependent, and may be unsuitable as a linguistic model for monitoring growth and development along broad-based continua as used in this project. Alternatively, the practitioners who were asked to provide the operational data using these indicators were unable to provide evidence of a consistent interpretation.

An exhaustive search of the literature has failed to yield any evidence of a theoretical discipline or model to underpin a continuum of adult numeracy, apart from the work of Chapman and Lee (1990) who basically challenged thinkers in the fields of adult literacy and numeracy to incorporate numeracy as an aspect of literacy. However, they offer no advice as to how to monitor growth and development. The numeracy scales developed in this project, then, represent one of the few attempts to develop such scales. There are others. Examples are presented by Jones (1990), Kirsch and Jungeblut (Quantitative Literacy) (1986) and Masters (1989). In the United States, Kirsch and Jungeblut have provided test-score-based continua describing the test items on underlying competency dimensions. No other scales appear to have been developed from the judgement base of practitioners.

The American literacy scales (reading), derived from the NAEP studies are described as follows:

Advanced (350)

Readers who use advanced reading skills and strategies can extend and restructure the ideas presented in specialised and complex texts. Examples include scientific materials, literary essays, historical documents, and materials similar to those found in professional and technical working environments. They are also able to understand the links between ideas even when those links are not explicitly stated and to make appropriate generalisations even when the texts lack clear introductions or explanations. Performance at this level suggests the ability to synthesise and learn from specialised reading materials.

Adept (300)

Readers with adept reading comprehension skills and strategies can understand complicated literary and informational passages, including material about topics they study. They can also analyse and integrate less familiar material and provide reactions to and explanations of the text as a whole. Performance at this level suggests the ability to read, understand, summarise, and explain relatively complicated information.

Intermediate (250)

Readers with the ability to use intermediate skills and strategies can search for, locate and organise the information they find in relatively lengthy passages and can recognise paraphrases of what they have read. They can also make inferences and reach generalisations about main ideas and author's purpose from passages dealing with literature, science, and social studies. Performance at this level suggests the ability to search for specific information, interrelate ideas, and made generalisations.

Basic (200)

Readers who have learned basic comprehension skills and strategies can locate and identify facts from simple informational paragraphs, stories, and news articles. In addition, they can combine ideas and make inferences based on short, uncomplicated passages. Performance at this level suggests the ability to understand specific sequentially related information.

Rudimentary (150)

Readers who have acquired rudimentary reading skills and strategies can follow brief written directions. They can also select words, phrases, or sentences to describe a simple picture and can interpret simple written clues to identify a common object. Performance at this level suggests the ability to carry out simple, discrete reading tasks.

The Comprehensive Adult Skills Assessment System (CASAS) provides a competency scale as follows:

Level A

These people have difficulty in providing personal identification in written form, for example, job applications. They are not able to compute wages and deductions on paychecks and cannot follow simple basic written directions and safety procedures. They have difficulty with basic literacy and computational skills necessary to function in employment and in the community.

Level B

These people have difficulty pursuing other than entry programs requiring minimal literacy skills. They can fill out simple job application forms and can perform basic computations.

Level C

These people are functioning above a basic literacy level, and are able to handle basic literacy tasks and basic computational skills in a functional setting. They have difficulty following more complex sets of directions and are functioning below a high school level.

Level D

These people can function at a high school entry level in basic reading and math. If they do not have a high school diploma, they can profit from instruction in high school level. They can usually perform work that involves following oral and written directions in familiar and some unfamiliar situations. Those who are eighteen years and over, could profit from instruction, and in a short time, have a high probability of passing (a particular examination).

In Canada (Jones, Satin, Kelly and Montigny, (1990) defined three separate scales. The levels of Reading were defined as follows:

Level 1

Readers at this level have difficulty with printed materials. They most likely identify themselves as people who cannot read.

Level 2

Readers at this level can use printed material for limited purposes only, such as finding a familiar word in a simple text. They would likely recognise themselves as having difficulties with common reading materials.

Level 3

Readers at this level can use reading materials in a variety of situations providing the material is simple, clearly laid out and the tasks involved are not too complicated. While these people do not see themselves as having significant reading difficulties they tend to avoid situations requiring reading.

Level 4

Readers at this level meet most every day reading demands. This is a diverse group which exhibits a wide range of reading skills.

In the writing scale they define three levels.

The Canadian Writing Scale

Level 1

People at this level have little or no writing abilities.

Level 2

People at this level have abilities limited to writing single key words or very short phrases.

Level 3

People at this level have the ability to construct text which meets most everyday writing demands.

The Canadian Numeracy Scale

Level 1

People at this level have limited numeracy abilities which enable them to, at most, locate and recognise numbers in isolation or in short texts.

Level 2

At this level people can deal with material requiring them to perform simple numerical operation such as an addition or subtraction.

Level 3

People at this level can deal with material requiring them to perform sequences of numerical operations which enable them to meet most everyday numeracy demands.

These scales should be compared with those appended to this report. While the detail is not equivalent, the general emphasis of parallel levels (1 to 3) are identical.

The scales provide an opportunity to communicate about literacy and numeracy. This approach turns around the thinking about assessment and reporting in that we can establish a common language about increasing levels of literacy. How the level of literacy is assessed is another the matter. A range of assessment methods will enable the acquisition of data from which it is possible to infer progress in literacy development. The assessment methods can include tests, work samples, interviews, etc. In developing scales like this the true application of Glaser's (1981) definition of criterion referencing, can be brought out. Glaser defined criterion referencing in terms of increasing proficiency along an underlying continuum.

Alternative to a Continuum

It became clear during the project that many involved in the field of Adult Basic Education could not accept that an underlying continuum exists. The arguments varied.

1. It was argued that to define a singular underlying continuum would be to oversimplify the development of literacy and numeracy.

2. A persistent claim was made that there could be no underlying continuum. That is to say, literacy does not develop in any particular direction. This argument seemed to be based upon the premise that literacy was always context-and stimulus-dependent. Following from this the argument was put that continua would be impossible to define.

3. The project was titled The Competency Rating Scales Project. It became clear that a substantial number of practitioners and academics in the field of adult literacy in Australia believed that the project should list the competencies and provide a separate rating scale for each competency. The difficulty with this approach is that the competency scale becomes a massive checklist. Each set of circumstances, then, would require their own checklist. Each context and each context - stimulus combination would require its own rating scale and its own sociological definition of literacy. Part of the argument could well stem from the overall rejection of comparative assessments. If every individual is rated on their own separate and distinct competencies, it would become impossible to make comparisons amongst individuals. With an underlying continuum it is certainly possible to compare among certain individuals and groups. While this may not be the primary purpose of such a scale, it remains possible. Direct comparisons become difficult when several scales are produced and used. Detailed checklists become even more difficult to use when communication is made about groups. Using scales like the ILY scales, based on a continuum, becomes easier and more accurate at a group level.

The specific items would differ across programs and contexts. Each discrete competency represents a belief that, if it is mastered, the adult will acquire the ability to process text-based information and acquire high levels of literacy. Each competency may be of discrete instructional value but they are not a part of a cohesive measure of literacy. They do not and should not purport to assess any defined, coherent construct of literacy.

Another alternative to the underlying continuum would be to adopt that approach reported by Wickert (1989). No underlying dimension of literacy was investigated in that study, although domains of Prose, Document and Quantitative Literacy were put forward. No analyses were conducted to determine whether or not underlying dimensions existed in the data. In the case of Prose Literacy, this would be most difficult given the small number of items (4) involved. Instead, Wickert reported on an item by item basis, and documented the percentages of the population, and sub-groups within the population, who could perform specific skills. This is in fact an application of the competency by context-stimulus rating scales approach. The wide acceptance of the Wickert study in Australia by the media and by practitioners, underlines the acceptance by the Australian adult education population of this form of assessment and reporting. The usefulness of this approach is restricted because it is not possible to generalise beyond the particular instances tested. Unless the items can be shown to be acting in a cohesive manner and working together to measure some unified underlying dimension of literacy, there is no way in which the data can properly be used to talk about the literacy levels of the population or about types of literacy. The self selecting sample makes this even more problematic. Instead, reports on such data are restricted to isolated statements about each of the competencies assessed. Consequently, the media has reported with some alarm the proportions who cannot calculate a tip on a restaurant menu or about the proportion of the population who cannot sign their name on a bank card or find the expiry date of a licence. While these are interesting facts they are of little assistance to programmers and policy people who wish to develop overall strategies for the improvement of literacy in the adult population. Some means of generalising beyond individual competencies is important and essential if we are to go beyond the context by competency by stimulus interaction.

Assessment and Reporting

The approach taken in developing the ratings scales followed that outlined by Griffin (1990) in the development of the Victorian Literacy Profiles, and to some extent the development of Targets and Levels as discussed by Black (1987). Instead of using a standardised assessment approach, the report (or at least the language of reporting) has been standardising. In providing descriptive criterion scales of increasing competence in Reading, Writing, Basic Computation, Measurement and Information Processing, the methods of gathering assessment information are left open. That is, the assessment procedure would be free to match the course, the context, the job or whatever occasion arises in which a person's literacy and numeracy needs to be described.

In describing the concepts "assessment and reporting" the distinction is made between the act of gathering the information and the act of communicating to others. The scales provide the communication mechanism and enable a detailed profile of adult literacy and numeracy to emerge. The question of how it is administered is tied to the methods of assessment or data gathering. Tests, interviews, work samples, projects, observation, self and collaborative assessment are all possible. The common scale provides the interpretative framework for the assessment information. This is an important distinction and one which sets the project apart from others in the field of assessment. The project did not intend to develop an assessment instrument. There was to be no test, no interview or survey. The assessor needs to determine how best to collect information which can be translated into terms within the scale. The scales should become a method of communication between assessors and audiences after the assessment has been conducted in a manner suitable to the context in which the information collection has purpose and meaning. The project and the development of the scales have been based on a set of assessment and reporting principles which are elaborated on below.

The Principles

In any instance of human interaction, a process of assessment takes place. The participants in the interaction continuously assess each other in a variety of ways. Assessment involves collecting information, interpreting it and making decisions based on that information. Information can be collected in a range of ways. The collection process need be neither formal nor standardised.

Assessment is not restricted to teachers and students. However they provide the most common context in which assessment of development takes place. In the home, parents and children continuously assess themselves and each other. Workers continuously assess each other whether they be management or wages personnel. A supervisor assesses an employee's work, the employee assesses the supervisor's practices. The assessment is never one way only. In addition, individual's each assess themselves in terms of performing tasks and of expectations involved.

In the classroom, teachers continuously and intuitively assess learners. (The learners are also continuously assessing the teachers). They observe, interact, question, direct and support learners in the process of teaching and learning. There are numerous instances in which the teacher makes an observation, interprets it, makes a decision and uses the observation. The most obvious example of this is the question and answer routine of the classroom. Generally, the process involves the identification of both strengths and weaknesses of the student. This formative and intuitive assessment is one of the most powerful influences on developing competencies and in promoting educational growth and development. If it can be harnessed, and the best of its processes and impacts made available to others, ways of interpreting, recording and communicating the information gained from the intuitive, analytical and formative assessments can be found. The relevant audiences can be even better informed, not only about the outcomes, but also about the processes of learning and assessment. The idea behind this project was to make the implicit, intuitive and formative assessment methods explicit and available to others so that this powerful information can be systematically gathered and recorded. This might be best

achieved by developing the diagnosis and analysis based on a formalisation and harnessing of the intuitive processes of the observer who can be a teacher, a learner or an adult in any role or context.

In order to make sense of observations, some means of putting them in context is needed. In many instances it may suffice to judge whether the task can be completed. In others it may be necessary to assess whether new skills can be learned. This requires additional information - particularly in relation to the literacy and numeracy requirements of the new task. It also requires more knowledge of the relative literacy levels of the task to be learned and the skills possessed by the individual. The literacy and numeracy scales need to be supplemented with appropriate assessment methods in order to be used in the full range of contexts. The assessment methods for classroom and non-classroom contexts will, in all likelihood, differ.

There are many formal ways to gather information. Tests have been used for many years. There has also been in the recent past, notions of goal-based, work-required assessments and other ways of adding to the traditional tests, simulation tasks, assignments, projects, performances, essays or reports and so on. In essence some output is required in order to determine the level of development. They can be asked to write, speak, act, perform or create (through drawing or building, etc.). Each gives an observable behaviour or product which can be used as an indicator of learning. Each on its own gives only a small portion of the overall picture of learning and development. Combining multiple observations gives a much broader view of the work and adds to the validity of the conclusions reached. For this reason, it is better to collect assessment information over a long period of time (where this is possible). Self assessment becomes more powerful under these circumstances.

The need for a method of synthesising the information is even more important when different kinds of literacy are assessed. A standardised paper and pencil test may be the most appropriate and efficient way of assessing cognitive development at a point in time but it might not be for other domains. There is a need to recognise and encourage use of multiple ways of observing behaviour.

There is also the process of synthesising, recording and communicating to audiences. The communication needs to be clear and correct and to establish appropriate expectations for the receiving audience. Where the focus of the report is on the skills, competencies and behaviours, the expectations can be based on a more definitive information base. In adult literacy, the link between education and employment, for example, can be clearer if the learned behaviours can be matched with the requirements of the tasks to be performed for a particular job or can be shown to be sufficient to enable a range of tasks to be performed. This requires a specific approach to assessment and underpins the importance of the distinction made earlier between the "what it is" aspect of literacy and the "what it is for" aspects. Scales of the "what it is for" would be inappropriate. Information on these aspects of literacy would be difficult to interpret in the traditional ways of norm referencing or criterion referencing.

There are three basic ways to interpret assessment observations. In addition to norm referenced and criterion referenced there are ipsative referenced interpretations.

Norm Referenced Interpretation

Norm referenced assessment has in recent times been criticised as associated with comparisons between individuals, organisations and systems. The comparisons were seen as unnecessary (and even inhibiting of learning) and norm referenced assessments were regarded as the major tool of these comparisons. As such they have been vigorously criticised by large proportions of the education community. The focus of the criticism has been norm referenced standardised tests. However, the reality of educational assessments is that they are almost all norm referenced. These are assessments based on expectations and qualified by the nature of the particular group. Performances are regularly described and qualified in terms of what might be expected given the background, physical or intellectual disability, command of English, exposure to a particular

experience or the amount of time spent on a task. When these types of qualifications are made, a norm referenced interpretation is used. In an effort to avoid comparisons, (so often associated with norm referenced assessment and in particular with standardised tests), the assessor explains a performance by implicitly describing how that performance accords with expectations given the individual's membership of a specific group or population. This is also true for self assessment. The belief that normed assessments are quantified and only arise from standardised tests is widely held and unfortunately tends to hide the widespread practice of qualitative, descriptive normed assessments.

In norm referenced assessment the performance or the task is interpreted in terms of who could be expected to do it. When a standardised test is norm referenced, the expected performance is defined by the publisher who surveys large samples in order to establish what levels of performance can be expected by particular groups or subgroups in the population. Each task is described in terms of the proportion of the population which can be expected to succeed. Interpretation of performances are then made and referred to, or qualified, in terms of the expected levels of performance. This type of description is no different to any other assessment which is qualified by descriptions of personal characteristics of smaller groups known to the teacher of administrator. The description may be in terms of personal characteristics or opportunity but it is still norm referenced assessment. The description is couched in terms of a comparison to a level expected of (or normed on) other similar adults. The comparison between individuals is implicit, but when expressed as a qualification assumes an air of acceptability. This may have serious consequences for individuals and for education or industry in general. The form of interpretation and reporting exemplified in the study of Australian adult literacy (Wickert, 1989) is one of norm referencing in that specific tasks are reported in terms of the proportion of the population which could be expected to successfully demonstrate them. However, it should also be noted that while the study reports percentages which could be interpreted as norms, the report makes no such claims. Given the fact that a self selecting sample of approximately 1450, out of a total of over 7000 subjects approached, agreed to complete the survey, the percentages reported in the national study should be treated with due caution. In any case, reporting percentages of a group that have successfully completed a series of tasks does not imply, nor should it purport to imply, that any underlying coherent construct of literacy is measured by such an objective or norm referenced test.

When teachers, tutors or administrators, managers or workers qualify their observations of individuals, the interpretation and the expectation is based on experience. The effect of the experience on expectations and interpretations is amplified when the experience is predominantly gathered in a single local area. There is a distinct danger of distortion through localisation of standards because people

> "... *are persuaded that those things which occur frequently in our experiences are 'normal'.*"
> (Black, 1987, 16)

Experiences condition expectations of what is "normal" or average and these expectations are reinforced by successive experiences with similar groups of people. The expectations become the standards. These in turn begin to affect the way in which people are both taught or supervised and assessed. The implicit and regular norm referenced assessments serve to reinforce the expectations and localised standards. It is a common practice which is easily recognised. The irony is that comparisons based on tests are declared to be unfair because of different backgrounds, opportunities and, no doubt, expectations. The difference in skill levels, of developmental progress, or of potential opportunity and success seem to be buried by the insistence on qualified interpretations of assessment information. There is some basis to the argument however, because comprehension is very much determined by the existing knowledge base and this in turn is very much determined by experience. Hence not only the assessment but also the performance is influenced by the experience of both the assessor and of the person being assessed. Local norms are often used to argue against standardised norm referenced assessments. Because of the Wickert

study, Australians now know (at least according to media but not according to Wickert), what to expect of particular groups in the population on a range of tasks in literacy and numeracy.

Localisation of standards can be overcome in several ways. Clear statements of required competency levels from credentialing or administration authorities can guide expectations. Procedures such as group or statistical moderation also help to broaden the perspective on potential performances — even given overall group characteristics. The practice is common in industry and among teachers at senior secondary levels and among teachers at tertiary and post graduate levels. Communication between adult basic education providers, adults who pass through the courses, employers and others who use the literacy and numeracy skills can also be a form of moderation. Moderation helps to overcome localisation of standards and ought to be an important adjunct of assessments which are based on direct observations. There are difficulties in use of norms but the major problem is the permanent labelling, qualification and excusing performance levels and not necessarily the comparisons among individuals.

Criterion Referenced Interpretation

In the 1960's two independent educational developments provided a new approach to the interpretation of assessment information. A Danish mathematician, Rasch (1960, 1980) developed the concept of underlying growth continua or latent traits. It lead to a general development of Item Response Theory. Rasch reasoned that the nature of these traits could be defined by the tasks performed. If the tasks were to be arranged in order of their increasing amounts of attribute required, then the nature of the trait was defined by both the nature of the tasks, their order and the attribute required to perform the tasks. Development could be traced by progress along the trait or growth continuum. In another development, Glaser (1963) put forward the notion of criterion referenced testing. This also described performance and development in terms of the tasks performed. He later (1981) argued that criterion referencing should ...

> "...*encourage the development of procedures whereby assessments of proficiency could be referred to stages along progressions of increasing competence*" (Glaser, 1981; p.935).

This was a central concept of the present project which attempts to identify stages of progress in literacy and numeracy to enable assessments to be directly interpreted. No qualification of the group or the individual is inherent in either the definition of the progression or the task performance. Progress is defined in terms of the tasks completed or stages of developmental competence. In this way, criterion referenced interpretation is the reverse of norm referenced interpretation. Instead of interpreting the task or performance in terms of the characteristics of an individual or group, criterion referencing involves the interpretation of the performance in terms of the tasks completed and the behaviours or competence displayed. The performance or task is interpreted by its relative position on a growth continuum and becomes an indicator of development. This is exemplified by the way in which the National Assessment of Education Progress (NAEP) was reported by Kirsch and Jungeblut (1986). In their report dimensions of increasing proficiency in Prose, Quantitative and Document Literacy were defined using the fit of the item response model to their data. Results were then reported in terms of location on those continua. That is, the results could be interpreted in terms of which skills could be exhibited and the level of attribute required to demonstrate performance.

Two other developments have recently improved the applicability of the ideas of item response theory and criterion referenced assessment applicable. The first is a generalisation of the idea of testing. Instead of a test being seen only as a paper and pencil exercise which predominantly focuses on cognitive tasks, there is a general move to reinterpret tests as tasks performed under specified conditions (Black, 1987; Griffin, 1987). Criterion referenced interpretation now enjoys a more popular acceptance as a concept but it is only slowly being implemented in practice due to the overall lack of defined progressions of increasing competence.

Ipsative Referenced Interpretation.

The third frame of reference for interpretation of assessment information is an ipsative referenced approach. The term comes from the latin "ipse" meaning self. It applies to self referenced assessment, and not to self assessment. An individual can self assess by referring to a group expectation, to a set of tasks performed and hence use norm and criterion frames of reference. With ipsative referenced assessment, the individual's own interpretation relative to personal values, aspirations, expectations interests or beliefs are used. The individual's own observations are needed in these areas in which the individual can be the only observer and interpreter. These kinds of data are often collected in interest inventories for example. This could apply to assessment of reading interests and activities.

The Assessment Model

The end result of the project was to be a set of descriptive scales. Each scale was expected to describe increasing competence in areas of literacy and numeracy. The scales themselves were not expected to be an assessment instrument. They were to form a reporting or communicating framework. The act of assessment is separate from these. Practitioners, policy specialists , employers, workers and others can decide on the best way to gather appropriate information in order to establish the approximate location of each individual on the series of scales. This exercise yielded a profile of an individual. The two steps, (Assessment and Reporting) are separate. The assessment can be in the form of direct observation, written tests, interviews, work samples, and so on. The scales provide a way of interpreting the assessment information and for communication among stakeholders in the process. Figure 1 illustrates this model of assessment and reporting.

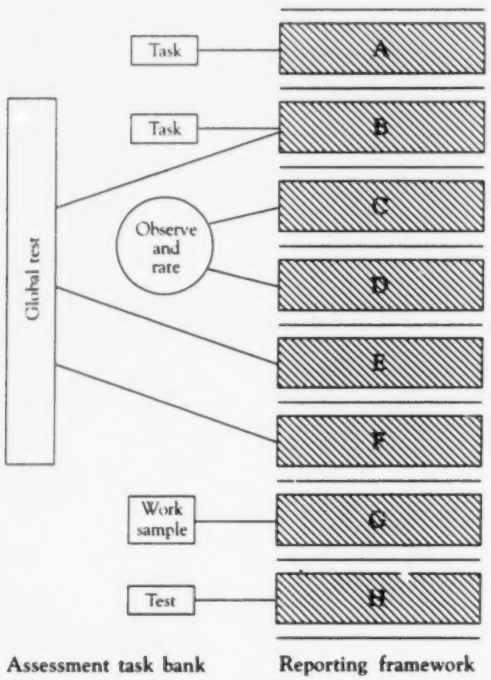

Figure 1

Developing the Scales

From 1986 to 1989, the Victorian Ministry of Education developed a model of assessment and reporting which offered teachers an opportunity to assess students without entering into the problematic areas outlined above. The literacy profiles (Griffin 1989, 1990, Victoria, 1990) adopted a model based on language proficiency scales and have provided an assessment and reporting model which is being replicated in areas of numeracy, science, oracy and social education. State wide testing programs in New South Wales, have developed means of reporting in terms of "bands" rather than scores. In Britain, the Task Group on Assessment and Testing (Black, 1987) recommended levels of progress towards target outcomes. In literacy these bear a remarkable similarity to the Literacy Profiles (Victoria, 1990) in that levels have been defined in descriptive terms (Barrs, Ellers, Hesler and Thomas, 1990, 1990a). In the United States wide-spread use of descriptive reporting in criterion scales is emerging. Several of these scales have been reported in earlier sections of this report.

A Framework for Literacy Competency Scales

Throughout this report, reference has been made to the widely accepted notion of types and levels of literacy. When combined with the principles of assessment and reporting. A combination of types and levels of literacy yields a framework for the development of competency rating scales and profiles. Details of this framework are outlined by Griffin, Jewell, Forwood and Francis (1990). This is illustrated in Figure 2 below.

	FACET			
LEVEL	Read	Write	Numeracy	Document
Influence	☐	☐	☐	☐
Improve	☐	☐	☐	☐
Require	☐	☐	☐	☐
Access	☐	☐	☐	☐

Figure 2

Figure 2 illustrates the levels of literacy linked to access, participation, improvement and influence on lifestyle and culture.

Figure 2 can be seen as a grid. Each box represents a description of the facets of literacy for one of the levels. Reading vertically for each facet, there is a progression of proficiency defined by the description of increasing competence.

Alternative Approaches to Developing Scales

There were several methods available to identify the content of the scales. Cronbach (1978) outlined a procedure which he called the actuarial method. This involves finding individuals who already possess the characteristics which we seek to define and describe them. Groups of individuals become the yardsticks for the development of the scale or at least in obtaining the criteria to place on the scales. This breaks the dependence on other methods such as testing and task analysis, and the link between the competency to a specific task. The most fruitful method of developing scales of literacy was to combine all of these approaches and to refer the data to key players for their validation. The combination can lead to the description of development in each of the kinds of literacy. Tasks were analysed to identify the underpinning competencies and

the evidence of development in each kind of literacy. This was the case in the development of the literacy profiles (Griffin, 1990, Victoria, 1990).

The initial procedure was to identify and classify tasks that were considered important in adult literacy. These included the tasks of the NAEP tests but also included many other tasks considered by teachers and those in the workplace to be important. An analysis of those tasks identified underlying competencies and there were generally several competencies associated with each task. This was an important reason to proceed with the actuarial analysis rather than rely on the sole use the test-based approach.

An alternative would be to take the approach adopted by the NAEP study of youth literacy and the Australian use of the test items for all adults. In that approach, set tasks were identified which were argued to represent the literacy tasks undertaken in every day life. Whether all Australian adults perform the same tasks as North American youth is not addressed. The tasks are based on the Kirsch and Jungeblut definition of each of the forms of literacy. The definitions described specific task types which could be tested such as computing the tip on a bill, completing a bank deposit slip or reading the label on a medicine bottle. Each of these tasks served to define functional literacy, which we discussed as being related to the required level of literacy. Kirsch and Jungeblut showed that the items worked together in a cohesive fashion to define underlying dimensions of Prose, Quantitative and Document Literacy. Using similar analytical methods (Item Response Theory), the latent trait models were tested on the Australian data. The models did not fit the Australian data. This result is to be explored elsewhere but perhaps changes made to suit the Australian culture, application to a different population, modified scoring procedures, selection of items or a combination of these and other reasons lead to a failure to identify dimensions similar to those underpinning the American data. A completely new set of items would have been necessary in order to use this approach. However, a subset of items may be used to define a general dimension of literacy in studies using the Australian data.

The notion that the underpinning competencies might not transfer from one task to another suggests that sole use of the test item approach may not give sufficient information about literacy. This may explain the lack of fit to changed items. It is possible to define many tasks and test large numbers of individuals on those tasks. However if Mikulecky and others are correct, this may lead to difficulties in generalising beyond the specific tasks tested. Indeed Wickert (1989) reported only the results on specific tasks. There was no evidence presented or claims made about the generalisability of the results or even an assertion that the results could be developed into a scale of literacy. Secondary analysis of the data suggest that the dimensions are not in evidence in that data. Hence the approach was not really an option.

The Preferred Process

The process adopted for this study began with an analysis of the behaviours which indicate that literacy competencies had been established. For each competency identified as underpinning a particular task, the kinds of behaviour that individuals exhibit were examined. The analysis sought to identify whether the competency was fully established, just developing, beginning or absent. This became the major part of the base data used in the development of the competency ratings scales of adult literacy. Analyses of literature, curriculum documents and course outlines also provided data or descriptions of indicative behaviour.

Indicators were used in surveys of adults to cover as wide a range of development as possible in each of the types of literacy. They were sorted by selecting those items that an item response model (Masters, 1982) identified as forming a descriptive criterion scale. The indicators were then organised according to their relationship to one another. Matrix sampling (Sirotnik, 1978) enabled the use of a few indicators for each individual, and overlapping sets of indicators were used to map all of them onto a set of scales.

What emerged for each scale was a "pyramid" of indicators. At the bottom of the pyramid were behaviours that almost everyone exhibited and at the top of the pyramid were behaviours that

very few people exhibited. The relationship between the indicators was important. Indicators behaved together to form a cohesive set within each of the major components or kinds of literacy. They were required to have had an implicational relationship. That is, an individual exhibiting behaviours at the top of the pyramid was likely to exhibit behaviours below that level. (Exhibiting behaviours at any level does not imply that behaviours above are present, but it does imply that behaviours below are likely to be present). Behaviours which did not fit within this implicational relationship were excluded. This enabled a cohesive set of behaviours to be identified which provided a set of competency rating scales from which individual profiles could be developed. Hence the kinds and levels of literacy development were to be described in terms of observable behaviours, identified via workshops, literature analyses and then surveys of adults. The early drafts of the descriptive scales were scrutinised to ensure that their content was consistent with theoretical understanding of language and referred to specialists for consultation in this area.

In gathering data for the project a number of sources have been used. Meetings with practitioners, policy specialists, work supervisors, and employees in a series of workshops were held. These are described elsewhere (Griffin et. al. 1990). The literature on adult numeracy and literacy was examined in a search for descriptions of skill, competence or development in whatever guise they were presented. Details of the descriptions were circulated to practitioners, reference groups and specialists to obtain their inputs.

Those Involved

A range of people have contributed directly to the development of the scales. According to the nature of their contribution, these people were organised into the following groups:

1. The Workshop Participants

The data gathering started through a series of workshops held in Adelaide, Melbourne and Sydney. The workshop participants were adult literacy practitioners, workplace supervisors and employees and others in positions to observe, on a day-to-day basis, the demonstration of literacy skills in the workplace or the community.

2. The Reference Group

The data input was broadened by contributions from "reference persons"; others who, like the workshop participants, interact with adults on a day-to-day basis, in an educational, work or social/community setting. Together they contributed observations of the skills demonstrated by adults. Reference persons were involved in providing both comment on the output from the workshops, suggesting other examples of indicative literacy behaviour and in trialing the scales.

Broadening the participant group in this way enabled the involvement of groups who focus on literacy beyond the access and participation levels. Reference groups were established to represent industry, government, academic institutions, adult year 12, apprenticeship training, tertiary and other further education, migrant education and those involved in policy and in language theory. These were drawn from all Australian states and from New Zealand, Canada, the United States and Britain. Broadening the reference group was necessary in order to comply with the project brief which required the full range of literacy to be documented (see Appendix A).

3. The Expert Group

The expert group contributed the consultative breadth. A wide range of literacy and numeracy education experts, both Australian and overseas, agreed to provide comment on the scales from their theoretical perspective. The expert group included number of academics, consultants, employers and union representatives. Experts were also consulted on the appropriate uses and administration of the scales. Experts were identified as belonging to two particular groups. One group represented academics whose expertise was sought in relation to the theoretical bases of the scales, the language or numeracy model that underpinned the scales and the refinement of the expression of the descriptions of indicative behaviour. The second group contributed their

impressions of the likely impact of scales on policy and in-service provision. These were the policy workers group or the government policy developers/administrators.

The Process

The sequence of activities in the development of the competency rating scales followed the following four stages:

1. Data Definition Stage

In this stage practitioners described literacy competencies underpinning tasks that were commonly encountered. These practitioners worked in Technical and Further Education (TAFE), adult basic education, industry, administration, adult secondary education, adult migrant education, and specialists who have contributed to the development of the professions working with adult literacy and numeracy. Literature searches, examination of syllabi, test items and conference presentations also enabled the identification of further competencies which could be presented to reference groups.

The process involved conducting workshops in which learning and work tasks were analysed for their underlying literacy and numeracy competencies. The use of Reference groups enabled a broadening of the nature and number of resources involved in the project. All materials were referred to groups in all states of Australia and overseas (Canada, NZ, USA and UK).

Workshop participants and reference group members were also asked to check and refine the indicators. The data was then checked against theoretical research and other published data before referral to specialists for further evaluation and advice.

2. Development Stage

A series of surveys were conducted. These are designated as S1, S2 and S3.

(S1) Scaling the indicators

The competencies from the workshops were sorted into draft scales on the basis of *the analysis of survey* responses. First, the competencies were collected into checklists. The checklists were then distributed among workshop participants and reference group members. Each recipient was asked to complete the checklists on up to 10 adults. Each indicator became an item on the checklists. For each item respondents were asked to use a rating scale to indicate whether they were sure that the adult had *never exhibited* the behaviour (rating = 0), had *fully developed* the behaviour (rating = 2), or to indicate whether they were *unsure* (rating = 1)

Indicators were divided into overlapping checklists. In Reading there were 21 checklists each of approximately 20 items. Writing consisted of 18 check lists each of 20 items. In Numeracy, 23 check lists each of approximately 20 items were formed. All checklists overlapped by approximately 10 items to facilitate equating the item on to a common scale. The data was analysed using a Rasch Rating Scale model. All workshop participants, and reference groups were mailed the check sheets, answer sheets, rating instruction and a request to rate up to 10 adults on the literacy items. A separate group of reference persons was identified for the numeracy indicators.

Two initial surveys were conducted. These are shown in Table 1. S1 (L) refers to Literacy indicators, S1 (N) refers to numeracy indicators.

	Target	Practitioners Replied	%	Target	Possible	Adults Achieved	% Achieved of Possible
S1 (L)	180	112	62.2	1800	1120	987	18.8
S1 (N)	54	38	70.3	540	380	342	9.0

** The % Achieved of Possible represents the average number of adults rated by each respondent.*

Table 1
Participation Rates in Survey S1 (L) and S1 (N)

The Target refers to the number of survey bundles mailed out to participants or reference groups throughout Australia. The numbers in numeracy are small. The process in this area was to contact specialists and ask for names for referral. Those persons identified were then contacted and asked to participate, by providing ratings on up to 10 adults over all indicators. The task for numeracy specialists was particularly arduous. Since there were fewer in a position to provide the data, greater demands were placed on them. The higher response rate indicated a high level of support for the project. Each person was rated on 100 items in order to cover the range of indicators and to obtain sufficient numbers in each cell of the matrix sample.

The Literacy survey indicator sets were divided into major sets of reading and writing. Within reading, indicators were then subdivided into sets defined as Prose and Document Literacy indicators. Respondents were asked to rate adults on each indicator independent of its subclassification which were not identified on the survey check-lists. The data analyses were designed to determine whether a latent trait could be described by the data and attempted to fit a mathematical model to the data — the Rasch Rating Scale model.

The model describes the probability of observing a behaviour, given the existence of varying amounts of literacy or numeracy. In fact the data actually described an observer's judgement rather than an absolute measure of the actual behaviour. Because of this, only indicators that could be consistently interpreted by large numbers of observers would provide data to be tested against the model. This is an important characteristic of the scale development process. The scales were to be subjective and there would always be room for large variation in interpretation. Indicators which demonstrated a cohesive interpretation pattern were considered most likely to lead to a more stable final scale.

Those competency indicators for which the model was found to fit the data were retained for the initial development of the scales. Scales describing increasing proficiency in 'Reading', 'Writing', 'Basic Mathematics Operations', 'Measurement' and 'Quantitative Information Processing' were identified. No scale describing Document Literacy was able to be identified using this process. Items on the checklists describing competency in dealing with documents did not provide data to which the rating scale model could fit. Reasons for this have already been outlined.

The Model was found to fit 62 percent of the reading literacy indicators, 57 percent of the writing literacy indicators and 63 percent of the numeracy indicators on the first analyses. Data for other sets were removed and a secondary analyses was conducted of these in both literacy and numeracy data sets. Analyses of the numeracy data appeared to confirm still underlying traits or domains of indicators. There were Basic Operations, Measurement and a third which was labelled Quantitative Information. This procedure is consistent with psychometric advice to analyse the misfitting items as a separate set to search for secondary dimensions (Wright & Stone, 1979).

In the analyses of reading indicators, no second subset could be identified. This was despite the decision earlier to include indicators which described specific documents, and which would be consistent with Document Literacy. Indicators describing competencies in specific genre failed consistently to elicit data to which the analyses could fit the model. This offers a number of possible explanations. First, Document Literacy could be too item-specific to be defined using general or non-specific descriptions. Kirsch and Jungeblut (1986) however have succeeded and described this dimension based on analyses of specific text items. They described the adult's response to a document as an interaction between the nature of the text, and the complexity of the task to be performed. When adults are observed in different contexts by a range of judges, dealing with widely varying documents it is not surprising that the judges or observers could not provide a consistent set of observational data.

The general development of reading process competencies has again been identified, perhaps because teachers and other specialists formed the major proportion of judges. By now literacy tutors and teachers have a sound background in reading instruction and the persistence of theory in the field has apparently lead to a general understanding of the reading process. A consistent interpretation is identified because of the common nature of psycholinguistic modelling of the

reading process. The systemic approach has not as yet gained sufficient adherents in the field to provide a basis from which a common interpretation could be derived. This uniformity of interpretation did not seem to be possible with respect to genre based models of reading. Teachers, tutors and other judges do not appear to be uniformly as well informed in this theoretical base. This was assumed to be a possible explanation for the inconsistent interpretation. Hence the scales reflect the model which appears still to be dominant.

A third explanation may be that there *is* no underlying dimension of Document Literacy. Perhaps growth, development or progress may occur within each genre, depending on the person's exposure to it. Consequently the approach adopted in this project is unlikely to identify that domain. Unfortunately, a latent trait analyses of the national literacy study data (Wickert 1989) also failed to identify the Document Literacy dimension (as well as the other dimensions). Further analyses are clearly needed, perhaps with multiparameter or multidimensional latent trait models. Sheehan and Mislevy (1990) have demonstrated that a linkage of cognitive and psychometric models are required to obtain a measure of Document Literacy, but their approach was not within the project resources. Further analyses are planned and will include this method at a later date. The concept of Document Literacy has a logical and intuitive appeal to it and some further study would be worth the resources particularly given the potential benefits to industry.

The end result of the S1 Surveys was the draft formation of five scales. These are listed in the Table 2.

Scale	Number of Levels
1. Reading	8 Levels
2. Writing	9 Levels
3. Basic Operation	10 Levels
4. Measurement	9 Levels
5. Quantitative Information	9 Levels

Table 2
Preliminary Scales after S1

(S2) Editing the Scales

The project then entered the consultation stage (S2). During this stage the scales were presented to a range of judges for editing and comment on the language model, structure, and content.

Once the initial scales were developed, they were edited by workshop participants, reference and expert groups. Practitioners were those individuals working in areas outlined in the definition stage of the project. Experts were identified via the literature as those who had published or made conference presentations to advance the profession involved in adult literacy and numeracy. Policy workers were those working in Government administration, developing and promulgating policy on adult literacy and numeracy provision. The three groups were not mutually exclusive.

Each of these groups was asked to make revisions to the scales. Their instructions were to examine the draft scales and to decide whether each indicator should be moved to a different level, edited or reworked, or omitted from the scale. They were also asked to provide any further important indicators which should be added to the scale and to comment on the nature and structure of the scales. On receipt of their feedback a revised version was circulated seeking further comment. It was planned that this iterative process would be repeated until stability of advice received indicated that major changes were no longer deemed necessary. In fact this was achieved very quickly after two rounds. The time frame of the project then prevented any further consultation.

As a result of this process, the scales were revised. New levels were developed in one case. The final structure of the scales is presented in Table 3.

Scale	Levels	Appendix
Reading	9	See Appendix B
Writing	9	See Appendix C
Basic Operation	10	See Appendix D
Measurement	9	See Appendix E
Quantitative Information	9	See Appendix F

Table 3
Final Scale Structure after S2

3. Consultation Stage

The draft scales were then checked in the workplace or classroom by workshop participants and by reference persons. They were assessed by an expert group for comment and editing. This phase enabled final adjustments to be made to the scales and also to gauge the face validity. Reactions of practitioners, policy developers and experts in Australia, the United Kingdom, Canada and the United States, could be used to assess the acceptability of the scales conceptual and theoretical bases as well as their substantive content to be assessed.

Three broad kinds of persons were identified for consultation. Practitioners and Industry representatives, policy specialists, literacy or numeracy specialists were approached for comment. Table 4 presents the target and achieved numbers in each group together with their distribution throughout Australia and overseas.

	Target	Practitioners	TOTALS Specialists	Policy	Industry
Victoria	138 (85)	68 (43)	23 (16)	23 (16)	22 (10)
New South Wales	59 (37)	30 (26)	18 (5)	5 (2)	6 (4)
South Australia	38 (28)	21 (17)	5 (4)	9 (4)	3 (3)
Tasmania	26 (16)	12 (8)	4 (2)	4 (2)	6 (4)
Queensland	15 (11)	6 (3)	4 (4)	3 (-)	2 (2)
West Australia	9 (5)	6 (3)	2 (1)	1 (1)	
ACT	24 (11)	15 (6)	4 (2)	3 (2)	2 (1)
NorthernTerritory	6 (3)	4 (1)	2 (2)		
New Zealand	5 (4)	5 (4)			
Canada	10 (6)	10 (6)			
USA	42 (24)	42 (24)			
UK	19 (14)	19 (14)			
Other	12 (6)	12 (6)			
	393 (248)				

Table 4
Numbers Approached during the Consultancy Phase of the Project by State and Nation

Table 4 illustrates the target numbers and return rates (shown in brackets). The figures indicate the numbers who had responded to at least one consultation.

The groups of practitioners, policy and specialists are not necessarily mutually exclusive within Australia. For purposes of reporting individuals have been classified according to their major areas of activity.

The non-response rate to the consultation was not uniform over the target group approached. Non-response was greatest in three regions. New South Wales, Queensland and Western Australia. Follow-up investigations in New South Wales revealed theoretical difficulties with the project and that a large number of participants and specialists had decided not to participate. A similar position was adopted in Queensland. In Western Australia, distances and a lack of

sufficient contact during the project appears to have led to less involvement. In South Australia, difficulties were experienced in maintaining contact with practitioners and specialists due in part to reorganisation of adult literacy provision in that State and movement of those involved. Timelines of the project also meant that final meetings of participants clashed with very busy schedules near the end of the academic year. One workshop had to be cancelled due to this problem. The project was scheduled to be completed by the end of the year and hence over crowded calendars led to some difficulties. This makes the contribution of those who worked throughout the project all the more valuable and appreciated.

An analyses of the responses proved to be revealing with respect to the face validity of the scales. Clearly there is a group whose withdrawal from the project was meant to indicate disapproval of the nature and model underpinning the scales. The exact extent and nature of the theoretical or substantial objections is not known. The feedback was in the form of non-response or unannounced non-attendance at meetings or workshops. A content analyses of the actual responses yielded data illustrating the typical comment made for each of the above types of feedback. This data is shown in Table 5.

Comment	% / Returns*	
Editorial	(+)	28
	(–)	—
Structure	(+)	22
	(–)	1
Approval	(+)	23
	(–)	4
Theory	(+)	7
	(–)	3
Staff Development	(+)	12
	(–)	—

** (+) = Positive Comment (–) = Negative Comment*

Table 5
Type & Distribution of Responses to Survey S2

Examples of comments are presented as examples of each of the categories above.

Editorial

"Rating 6: writes with a close match between oral and written vocabulary ... the concern here is that writers tend to move from oral language pattern — used and encouraged in basic language development — towards using language for special effect at a very high level of written usage — much later. So I query the position of this point; and if I have misunderstood the comment, then it may need re-wording."

"The Reading Scales emphasise process outcomes but neglect attitude outcomes. Many individuals can read but choose not to. One must develop a personal philosophical orientation about reading. Why read? What should be read and for what purpose? To function on the job? What good is it to have skill that you do not use? Would like to see motivation, and interest addressed."

Structure

"The idea of stating skills and abilities in non-discrete terms is most commendable. Although it may pose a problem for some of those who administer the scales, it does free you from a lock-step approach that often results in a mechanical approach to re-teaching learning situations."

"I began reading at Writing Scale 1 but felt quite disorientated with the descriptors so moved to begin again at Scale 9, thus building from the simple to the complex. I felt the need to do the same in the Reading Scales. Is it possible to reverse the order of numbering and printing to work from the simple to the complex?"

Approval

"I like the inclusion of so many life skills this is what our students are looking for."

"The strength of these scales is that they have been based upon real students' behaviours."

"What conclusive evidence is there to support that literacy and numeracy are learnt via an accumulation of skills in a set order? Indeed, how was the ordering of the skills in the Competency Rating Scales determined?"

"My overriding concern is with the purpose of the scales, what are they designed to do. There are many scenarios for how they could be misused. I do not support the scales as they stand, nor perhaps the concept that such a tool can/should exist." "I am disturbed by your draft scales."

Theory

"The model of writing, you appear to me to have in mind (although I sense you would deny this) is really a 'creative' or 'self-expressive' model. You seem to me not to be addressing sufficiently the department types or genres of factual experience."

"I think your scales need to address content concerns as well."

"I find it impossible to discern any evidence of a theory of education or learning or cognitive development that might underlie the choice of scale degrees. There is an air of ad-hoc-ery about the whole thing — as if it was put together in an afternoons brainstorming session with absolutely no philosophical underpinnings."

Staff Development

"A general staff development program on how to use the scales is also highly desirable."

"I think that the linguistic terminology included in some categories will expose a need for workers within the ALBE field to update or develop their knowledge of English grammatical structures."

"Most of the discussions of which I am aware have centred on concerns about either the standard set of tests that would be used to determine a students ranking on that curriculum would be developed or changed to suit the requirements of the scale rather than the needs of the students. Based on my knowledge of the current operations of ALBE providers in this region I do not see that either of these issues will be of major concern especially if staff development packages are made available."

4. Trial Stage

The scales were circulated to assess their suitability as a monitoring and reporting mechanism. A survey of practitioners and reference groups was undertaken.

Several centres agreed to provide data on the ASLPR as well as the competency scales. Reference groups were established with the Australian Army Psychological Services the Police and Fire Services Training Colleges, State and Commonwealth Public Service training groups and industry representatives as well as Adult Migrant Education Services and Adult Basic Education centres, TAFE, Adult Year 12 Classes and Tertiary student groups. The scales were trialed using self assessment, collaborative assessment, independent rater assessment, and with a mixture of training and no training both within and outside formal education settings.

The scales were field tested in many contexts. Two levels of data were collected. Quantitative data (ratings) enabled internal consistency estimates of reliability to be determined. Qualitative data (comments) from survey participants also provided a basis from which to assess the scale(s)

acceptability and face validity. This was outlined above. Table 6 illustrates the diversity of the groups with which the scales were trialed and the response rates for each group. In addition, the breakdown between ESB and NESB is shown for each group.

Group	Rater	Training	N	NESB	ESB	SCALES
1. Apprentices	Instructor	No	432	18	414	R,W
2. A.B.E.	Instructor	Yes	568	14	454	R,W
3. A.B.E	Instructor	No	115	19	496	R,W
4. AMEP	Instructor	Yes	52	26	—	R,W
5. ELICOS	Instructor	Yes	128	128	—	R,W
6. Adult VCE	Instructor	Yes	38	—	—	R,W
7. Training	Self	Yes	24	—	24	R,W,Q
8. Training	Instructor	No	25			
9. Industry	Self	Yes	201	2	150	R,Q
10. Public Service	Self	No	78	10	68	R,W,Q

Table 6

*Sample Survey Groups for S3 — Trial Stage **

** Training is defined as having been provided for those who have attended workshops, helped to develop the scales, or have been trained directly by project staff. ESB is defined as English as the major or first language. Respondents either rated themselves or were classified as such by their instructor/tutor.*

R — indicates ratings on the Reading scale
W — indicates ratings on the Writing scale
Q — indicates ratings on the Quantitative scale

For each band or level on the scale the following question was addressed ...

Does the subject consistently exhibit (or "can you say that you can demonstrate") all (rating = 3), some (rating = 2), or none (rating = 1) of the competencies listed in the band?

From this approach an adult could score a maximum of 18 points on each of the three scales trialed. Where group means are reported it is important to note that the samples were not random and that some of the data has been collected from untrained observers. Accordingly the data *cannot be regarded in any way* to be typical of any group. That is, *no normative interpretation can be made, and no generalisations can be established to the adult population.* Table 7 presents the mean scale score and reliabilities of the data for each group. The means are presented to one decimal place and the reliability of the judgements (Alpha) is presented to two decimal places with the decimal point removed.

		SCALE					
		Reading		Writing		Numeracy	
GROUP	N	Mean	α	Mean	α	Mean	α
1. Apprentice	432	18.7	78	19.6	76		
2. A.B.E. (t)	568	16.9	65	17.7	56		
3. A.B.E. (n)	115	17.6	69	18.7	59		
4. AMEP	52	15.4	80	17.2	78		
5. Elicos	125	14.9	67	16.4	71		
6. Adult VCE	38	23.9	85	23.5	83		
7. Training (l)	24	24.4	75	24.6	68		
8. Training (s)	25	23.6	82	24.3	84	23.5	78
9. Industry	201	21.3	87	23.3	86		
10. Students	53	23.2	86	24.6	82	25.5	74
11. Public Servants	78	21.5	61	22.4	56		

(t) trained (u) untrained (l) Instructor (s) self rating

Table 7

Several observations can be made from these data. First there is wide variation in estimates of internal consistency and that these variations could be related to the availability of training for the raters. While no rigorous study of the effect of training was designed into the trial stage of the study there is sufficient evidence in the data to suggest that further research into the effect of training on reliability of judgements could be beneficial. A study similar to that by Griffin (1991) on the reliability of the assessment of writing in the International English Language Testing System (IELTS) may be appropriate.

Relationship to the ASLPR

An analysis of the scales indicates a strong relationship with the ASLPR. A small sample of 52 adult migrants were rated on both the Adult Second Language Proficiency Rating Scale (ASLPR) and the reading and writing scales developed in this study. The sample is small and the migrants were all from lower levels of the ASLPR (less than level 2). Hence the correlation of 0.46, while low, is as high as could be expected. It is a well known phenomenon that a restricted range of values will curtail correlation coefficients. Again however, it should be noted that the sample size and its non-random nature prevents any generalisation. Further work would be needed to establish the empirical relationship.

Anchoring the Scales

Because the scales rely in the main on personal judgement, it is necessary to check the qualities of the judgements and to control the variation among judges. Judgements on descriptive scales have been shown to be unreliable unless accompanied by some form of moderation. The ASLPR, a descriptive scale used to report adult migrant levels of language development, has a training package associated with it, and extensive use of moderation procedures have been shown to help maintain consistency among experienced users. The same difficulties are likely to develop with the Literacy Competency Scales and moderation procedures will need to be developed, trialed and validated. External calibration of raters' judgements would be also be necessary. Various forms of standardised tests could be used to establish the properties of the scales and to moderate judgement data.

Exclusive reliance on any single moderation scheme would not be appropriate. For example exclusive use of a test-based check on the literacy scales necessarily involves an assessor setting tasks for adults to perform in order to establish a level of literacy and to compare this with either the self assessment or another assessors judgement. Testing remains important as an external validation of the scales as are experiences of individuals, judgements of experts, and other means of assessing the literacy development against the competency scales. However few measures appear to be available across all of the scales. The NAEP item bank obviously offers one external check against which to anchor the descriptive scales. Unfortunately the variations of the items used in the Australian Study failed to provide sufficient items which would fit a unidimensional set of indicators of literacy or numeracy reported by Wickert (1989). The items' value as an external criterion was therefore diminished. Several alternatives are available for criteria at upper levels of literacy. These would include standardised reading and numeracy tests particularly suited for adult populations.

The reporting and assessment model used argues that the scales are the basis of communication. The actual assessment can take a variety of forms; tests, work-tasks, direct observation, projects, and self assessment. This offers assessors the option of collecting assessment information in a manner that best suits the purpose and context of the assessment. Extensive work needs to be carried out on the validity and reliability of judgements associated with the use of the scales.

Using the Scales

Several issues arose during the development of the scales.

Audiences

During the project several audiences for information provided by the scales were identified. In education, there are adult basic education providers, TAFE (to middle level), Adult Year 12 and Migrant Education. Requests have been received from education systems at senior secondary level and from tertiary institutions, as well as from researchers and administrators involved in monitoring and accountability exercises. In industry, the bodies which have expressed interest to varying degrees have been management, various personnel, training and development, placement services and other representatives.

Project Expectations

The growing list of interested parties is an indication of the increasing expectation of the project in areas perhaps not anticipated at its beginning. Throughout the project the team has been asked about the scales' suitability as tests for placement and appraisal, monitoring, accountability, selection and needs assessment. The mistaken impression that the project was developing a series of tests was widespread. Accordingly, the scales may be expected to behave as a test or assessment instrument rather than a reporting framework.

The scales will have a broad range of potential applications. However, allowing expectations to grow beyond the provision of a central reporting device may lead to misunderstandings. Reporting needs to be separated from assessments. Tests, samples of work, direct observation, self assessment, simulations and other devices are a means of obtaining information about a person's skills. The scales should enable that information to be interpreted in a criterion referenced manner and to be reported to an appropriate audience.

Given this underlying tenet of the project, there is further work that needs to be undertaken. Use of the scales as a set of criterion descriptions will always involve judgement. The judge can be the person whose skills are being rated, or another person. In both cases the reliability and validity of judgements need to be assessed, usually against some external measure or criterion. Those who expect to use the scales in such a wide range of contexts will need to develop accompanying indices in order to monitor validity. The act of self assessment can be guided by content of the scales but the scales themselves are not the instrument of assessment.

Labelling

Concern has been expressed that the use of levels within the scales will jeopardise the self esteem of some individuals who are assessed. As with any measure of increasing proficiency or progress, the use of levels will always mean that people are associated with those levels. Current thinking tends to recommend an avoidance of this as a form of labelling and "self fulfilling prophecy". However, research into the effects of such labelling tends not to support this and point more to the continued exposure to frustrating tasks as the main reason for loss of self esteem (Raudenbusch, 1984). Knowing an individual's current level should enable more appropriate training. Materials beyond the level can more easily be avoided.

Discrimination

It has been stated that the scales may be used to discriminate against individuals below particular skill levels. Current Australian legislation allows this at a selection stage of employment. However, for people already employed the legislation defines discrimination as a failure to provide for remediation of the deficiency. The scales can be put to effective use in this area.

De Facto Curriculum

There is some concern that the content of the scales may become a defacto curriculum. Some teachers could be expected to teach to the scales. This would be a similar wash back effect as that associated with standardised tests. The scales may in some cases influence teaching and learning practices. Experience with the ASLPR does not support this. Nor does the experience to date with the Victorian Literacy Profiles.

Teachers without sufficient background in literacy and numeracy may indeed teach to the scales. For these teachers we must address the question of "What is their alternative"? Teachers who have strength in their teaching area do not depend on these types of scales. Occasional reference to them is sufficient, and their use as a reporting mechanism becomes the major application.

Bargaining Tool

In the industrial context both unions and employers may bargain over rights and responsibilities associated with levels on the scales. This could arise from identification of job requirements and employee skills, with each being described in terms of scale levels.

Overuse

The scales should be robust to their exposure in a large range of contexts. As with any measure, there may be a remote possibility that over use could eventually cause the scales to fall into misuse and eventually into disuse. The implementation of the professional development program and the overall dissemination strategy should prevent this or at least diminish the effect.

Threatening Nature

Application of the scales in both education and work settings may be threatening. In education both teachers and students may be threatened by the scales. Assessment is always a difficulty, particularly when the individual is not in control of the assessment. Self assessment can overcome much of this anxiety but this begs the question; an individual must be able to read in order to use the scales as a guide to self assessment. Those most threatened will need assistance and guidance.

Teachers may also be threatened by the use of the scales as monitoring and accountability devices. Information needs to be disseminated about the control which the scales offer, when compared to other forms of assessment. This will need to be taken up by providing authorities as their major responsibility.

In industry the use of the scales raises further questions. Self assessment has little benefit where an industry requires a definite level of literacy or numeracy for a specific job. A manager or supervisor needs to know the information in order to make appropriate training available. Some means of reducing the threatening effect of this process will need to be found. This should be the responsibility of the industry concerned.

Meta Language

Throughout the time of the project we have become increasingly aware of the breadth of expertise among adult education providers. This range of expertise has produced a dilemma. The scales need to be written in a somewhat precise language to decrease the range of possible interpretations. However, an increase in technical terminology was rejected by the end users, the practitioners. The use of precise language in the development phase of the project led to difficulties in obtaining consistent interpretation.

The adult basic education profession could use the scales as a staff development tool. By increasing the amount of technical content and terminology over a number of years the profession could be gradually educated in the meta-language of their craft. This could be associated with further descriptions of courses, pathways to learning, course design and resource identification. In this way the use and dissemination of the scales could lead a professional development strategy which would need to be implemented over a number of years. For non-education personnel using the scales, the language may prove to be a difficulty.

Moderation

Moderation is a means of checking personal judgements. Research is now consistently illustrating that moderation procedures are important in obtaining consistent interpretation of observational data.

However, opportunities for moderation exercises involve the provision of an infrastructure which allows for training, meeting time, an appropriate meta language and a clear idea of the purpose, use and implications of assessment information.

Assessment

The scales are not a set of assessment instruments. They constitute a reporting framework and a language with which to communicate about achievement and progress in literacy and numeracy. As such they need to be sensitive to changes in achievement and to changes in program and resource provision. The validity of the scales will to some extent depend on *how* data is collected in order to determine the appropriate level on the scale. While the scales are used in the classroom, teacher judgement will be sufficient. However for external communication, or in settings other than the classroom, more objective measures will be needed. Teacher judgement is not sufficiently reliable (Hoge and Coladarci, 1989) for purposes of system monitoring and accountability. Efforts will be needed to establish standardised assessment tasks which can be used to statistically moderate judgemental data. These tasks can range from interview protocols to paper and pencil tests.

No Single Level

In earlier sections of this report the scales were described as a non-instrument for assessment. They are set of instruments for reporting. The levels on the scales describe an accumulation of skills. They are not exhaustive in their listing. The levels are not mutually exclusive in terms of development. An individual can develop at more than one level at any one time. It would be rare for anyone to be described as being at a specific level. As such, the scales will seem as blunt instruments. The profile that becomes possible with the scales however, reinforces the message that was delivered after the Kirsch and Jungeblut (1986) study. There is no single measure. Moreover the scales should emphasise that there is *no single level* or point of development. It will be common for individuals to locate themselves over a range on each of the scales. A broad band profile of literacy and numeracy should then emerge.

Recommendations

1. The range of audiences to which information needs to be conveyed is very large. The current scales assume a knowledge of language and mathematics terminology. There is a need to develop and validate versions of each scale that are communicable to a wider range of audiences.
2. A range of standard assessment tasks need to be developed to provide reference points for users of the scales. These standard assessment tasks should include written tests, interview protocols, and other forms of making systematic observations. The assessment tasks should have known relationships to the scales.
3. A training program is needed for potential users. This is particularly true of users outside of the education system.
4. There is a need to establish a terminology for the adult education communication in three areas germane to this project — literacy, numeracy and assessment and reporting.
5. Further research into the existence and nature of Document Literacy is required.
6. The use of the scales as monitoring devices should be investigated. The time frame of this project could not accommodate following a group of adult learners over a sufficient time period to monitor any growth that may occur. Research into the sensitivity of the scales to monitor change is required.
7. If the scales are to find an application as a vehicle of accountability, their sensitivity to the effect of instructional change on learner progress needs to be investigated.
8. Research into community expectations of numeracy and literacy development should be undertaken and related to levels on the scales. Contexts for such investigations should include exit levels from schools, entry levels for employment and so on.
9. The potential for the scales to be used in industrial contexts should be investigated with particular reference to award restructuring and its implications for individuals, groups and industries.
10. Where the assessment is to be based on judgement, moderation procedures need to be developed. Both consensus and statistical moderation procedures may be necessary in different contexts.
11. Reporting protocols need to be developed at individual, class or other group, and means of aggregation of reports should be developed for systemic accountability purposes.
12. Normative surveys should be conducted to establish population norms for the scales.

Appendix A

National Project Brief

TITLE: Development of competency ratings scales for adult literacy and numeracy.

BACKGROUND: Through the National Consultative Council (NCC) for International Literacy Year (ILY) the Department of Employment Education and Training (DEET) will provide grants for a number of national level projects for International Literacy Year 1990.

PROJECT DESCRIPTION AND ESSENTIAL TASKS: The project is to develop appropriate ratings scales to assess adults' literacy and numeracy skills; to develop measures of the types and levels of literacy and numeracy needed and achieved by adults in our society. These would need to cover literacy/numeracy skills in the workplace and in daily living. This project will follow on from the survey of national adult literacy levels published on November 10 1989 under the title "No Single Measure" (University of Technology, PO Box 123, Broadway, NSW 2007).

Once developed the ratings scales may be applied to assist in ascertaining needs of individual adults. Some comparison with the Australian Second Language Proficiency Ratings Scale (ASLPR) for English as Second Language should be made.

The scales should be trialed.

Provision in the project budget should be made for printing and distribution costs of the pilot materials.

The project should seek to establish a common language to describe levels of progress in the acquisition of literacy.

TIME FRAME: The project should be completed by 15 November 1990. An interim report is to be provided by 20 April 1990.

FUNDS: An amount of $120,000 will be made available for this project.

STEERING COMMITTEE: A steering committee for the project should include at least one expert in the area of measurement and assessment who is not a member of the organisation carrying out the project. Membership of the steering committee will need to be approved by the ILY Secretariat.

SELECTION: A panel including representatives of the NCC for ILY and the ILY Secretariat will choose the successful applicant. Funds will be made available in the form of a grant and the appointment will be subject to the standard terms and conditions of a DEET contract.

APPLICATIONS AND ADDRESS: Individuals or organisations may apply. Joint applications are welcome. Applications should be framed in accordance with these guidelines and be made on the enclosed application form. Two copies of the application should be sent to the address below.

The Executive Director
International Literacy Year Secretariat
Department of Employment Education and training
GPO Box 826 Woden ACT 2606

All applications will be acknowledged and applicants will be notified of the results as soon as possible after the closing date.

Further information is available from the above address or by telephoning (062) 83 7893.

THE CLOSING DATE BY WHICH APPLICATIONS MUST BE RECEIVED IS WEDNESDAY 6 DECEMBER 1989

Appendix B

Literacy: Reading

A Beginning

Understands that the purpose of reading is to make sense of print. Understands that thoughts and speech can be represented in print. Has an understanding of what and why different people read. Can retell familiar texts when these are read aloud by others. Recognises own name in print. Has an established sight vocabulary of simple words. Distinguishes between letters, words and numbers. Recognises letters of the alphabet regardless of typeset, case, etc. Can match similar shapes in print (words, letters, etc.). Is developing visual and auditory discrimination. Can discriminate different shapes, or similar shapes with different sounds.

Identifies letters within words. Recognises words as symbols of things from real life or represented in pictures. Recognises numerals. Can identify the beginning and end of sentences. Understands the left to right, top to bottom orientation of reading.

B Recognition

Reads some words/phrases taken from spoken language. Recognises and responds to common signs, brand names and common advertisements from the environment. Recognises familiar words in context and in isolation (own name, names of family address, phone numbers, shop signs, days of the week, months of the year). Takes some risks when interpreting text. Can express opinions on the appeal or appearance of reading materials. Reads from left to right, front to back and top to bottom of a page. Identifies familiar key words, or parts of sentences. Understands that the specific meaning of a word is determined by its context. Reading of unfamiliar material is slow and focuses on words rather than sentences. Relies on sound-symbol correspondence and word shape to guess meaning (i.e. relies on graphophonic cues). May rely on decoding based on initial consonant blends.

C Access of basic information

Reads, with a definite purpose, short simple texts related to own interests and/or needs. Approaches text through meaning of clauses, phrases and sentences rather than individual words. Focuses on meaning as well as pronunciation. Comprehends text at literal level. Recognises commonly used words, phrases and simple sentences in context. Can predict meaning from short, repetitive patterned texts. Obtains information from print media (e.g. sports results). Locates simple and familiar information listed in alphabetical order (street names, surnames). Can self correct when reading errors occur. Guesses the meaning of an unfamiliar word or phrase, or skips it and comes back to it after finishing the sentence. Uses simple sentence structure or familiar words in a sentence to predict meaning. Able to confidently read familiar text in non-threatening situation. Understands the purpose of full stops, capitals, question and quotation marks. Discriminates between text types understanding the relationship between purpose and presentation (forms, notices, labels, books etc). Uses layout (headings/paragraphs/graphics) within the text as pointers to establish meaning at a simple level. Reads brief simple instructions. Can deal with information presented in consistent and familiar point form format such as shopping lists, time cards. Can predict unfamiliar words from a simple text given supporting clues.

D Understanding of familiar contexts

Reads simple texts and short books or articles of special interest independently. Meaning is not lost by substitutions in reading (semantic equivalence is maintained). Recounts content, events and characters of a short text or instructions written in a clear time sequence. Reads often. Finds the main idea in a short simple passage. Understands "first", "next", "then" as indicator words. Uses a variety of cues to decode unfamiliar words. Can use a dictionary to check some unfamiliar words. Can follow up on information from some alphabetic listings (e.g. make phone calls). Confident when reading in social and work situations. Reads and interprets most short novels, work related reports, simple safety notices, newsletters and notices.

E Identification of the general idea

Explains the main point of a short text on a familiar topic. Locates detail in specific parts of text. Can re-read text for detail after getting the gist. Can retain author's purpose when recounting. Calls on personal experience to understand an idea or an argument in text. Extracts information from a short news article on a familiar topic and/or texts which contain both Prose and tables. Selects relevant information for a specific task. Can combine ideas from short, uncomplicated text passages into a single report. Able to relate separate pieces of

information within a text rather than treat them as isolated or separated bits of information. Can relate specific information to general idea. Reads with a particular purpose, predicts meaning and confirms prediction based on own knowledge and experience. Understands that key words carry meaning. Can read familiar topic material (sport, social and everyday materials) for gist. Copes with most abbreviations in familiar contexts. Copes with simple materials of a technical nature relevant to work or personal interest.

F Identification and connection of detailed information

Reads widely for a range of personal, educational, vocational and social purposes, each with its specific vocabulary including acronyms and abbreviations. Can read a range of text types such as novels, manuals, technical journals, magazines, textbooks and newspapers. Reads text containing complex but familiar concepts. Identifies and interprets information in lengthy newspaper articles and other texts. Follows detailed written instructions related to work or personal interest. Can describe connection between events presented in texts. Selects passages or phrases relevant to particular tasks. Establishes links between personal experience and the arguments and/or ideas in text. Reads at different speeds using scanning, skim reading or careful reading as appropriate. Can read uncomplicated business letters, news items from daily press.

G Interpretation and generalisation from complex information

Understands that different types of text have different structures, vocabulary, and styles. Compares and generalises from information obtained from a range of text sources. Supports arguments or opinions about text with evidence from a variety of sources. Can understand routine business correspondence. Distinguishes between main and subordinate ideas, discarding irrelevant information. Acknowledges a range of possible interpretations of text. Can give reasons for acceptance of or disagreement with writers' opinions. Can adopt and defend an alternative point of view to that of the author. Comprehends standard newspaper feature articles. Can provide broad summaries of information read.

H Integration and analysis

Can understand, extend and restructure the ideas presented in text containing complex concepts such as technical literature. Questions, reflects on and presents critical opinion and analysis of issues encountered in text. Identifies and takes account of emotive and persuasive language and shows an awareness of a writer's bias. Evaluates statements and assesses conclusions that follow from the statements in written arguments. Selects, collates and summarises information with clarity and precision. Analyses, relates and integrates new materials. Makes generalisations even without clear explanations provided in the text.

I Subtlety and Insight

Extracts embedded ideas and implied messages from complex passages. Offers critical opinion or analysis of text passages and demonstrates an awareness of audience bias. Identifies irony and explains hidden meanings. Identifies and evaluates the argument or analogy in lengthy texts. Detects unsupported assertions or claims in text. Interprets different levels of meaning in multilevel material such as poetry. Explains textual innuendo and undertone and discusses similarities of themes and values in different texts.

Appendix C

Literacy : Writing

A Beginning writer/non-experienced

Understands that the purpose of writing is to communicate. Understands that writing is something that is and can be learned, even as an adult. Wants to use writing to communicate. Can form letters. Can copy numbers, letters and simple words. Can copy own name and address. Groups letters to form simple words. Writes own name. Copies familiar words from environment. Understands that writers can use a variety of writing tools. Is aware written English goes from left to right. Can write, without help, most of the alphabet.

B Words and simple sentences

Accurately writes own name and address, age and date of birth. Writes a limited number of known and familiar words independently. Writes simple notes, shopping lists. Conveys simple messages in writing. Shows concern about spelling. Spells simple and phonetically regular words correctly. Prints or writes legibly. Seeks constant reassurance or assistance in writing. Writes very simple sentences largely from memory. Can transcribe sentences, composed by him/her self but written down by someone else. Can write more complex sentences with assistance. Writes familiar words from the environment. Concentration span for the task of writing increases.

C Recording and conveying simple information

Commences writing for familiar situations without assistance or copying. Organises writing into complete, simple sentences in learned patterns. Can use simple conventional genres. Writes words in a logical order to make sentences with capitals and full stops. Uses upper and lower cases conventionally. Presents information in his/her own language. Uses first person when writing. Writes short and simple personal letters. Spells demonstrating recall of visual patterns and some knowledge of grapheme-phoneme relationships. Accurately records date, time and other information on forms, graphs. Transfers written and numerical information accurately from one setting to another. Has some knowledge of cohesive ties. Enters personal information on a simple form. Addresses letters and envelopes. Hand writes with regular letter formation. Checks for spelling and grammatical errors and completes limited rewriting. Uses a dictionary to check spelling and meanings of words. Makes judgements about appearance of words. Applies personal reading skills to explain own writing. Checks for clarity of meaning at a simple level. Writes with a close match between spoken and written language.

D Purposeful and independent in familiar context

Writes purposefully and independently to express ideas and convey a message using a vocabulary understood by familiar audiences such as peers, younger children or adults. Writes about information gained from reading resources. Recognises that different styles are used for different purposes. Uses sequence to convey time in narratives. Uses indicator words in writing (first, next, then). Organises sentences into paragraphs. Writes common abbreviations specific to a familiar context. Uses a dictionary, thesaurus or word checker. to extend and check vocabulary for writing. Rewrites for accuracy of meaning and suitability for intended audience. Proof reads for clarity of meaning. Checks and replaces words and sentences during revision of drafts.

E Developing complexity in style and structure

Writes for a range of purposes, using appropriate conventions, using formal or informal tone or register as the situation requires. Links ideas in an ordered and structured sequence. Writes sentences that vary in length and grammatical complexity. Can write in different forms: statement, question, command, acclamation. Uses basic formats for technical writing and writes narratives containing introduction, plot and resolution, all in logical order. Uses cohesive ties accurately. Writing discriminates between fact and opinion. Uses varied vocabulary and descriptive language. Uses point form or other format and layout conventions to convey information clearly. Uses tense, grammar and punctuation with few errors. Uses a mixture of text and diagram where necessary. Edits for accurate sequencing, changing and expanding ideas, style.

F Competent conventional writer

Communicates effectively in writing on a variety of familiar topics and to a range of audiences. Shows confidence when writing in areas of special interest. Links ideas into logical, simple paragraphs which are logical, coherent and cohesive. Varies sentence length. Associates related ideas without indicating the explicit nature of the relationship (e.g. cause and effect using time and place). Bases extended writing on a plan and

rough draft. Conveys meaning by selecting an appropriate vocabulary. Proof reads for ways to improve sentence structure, word usage, punctuation and spelling. Formats text to aid presentation (spacing, margins typing, headings). Copes with most forms regularly encountered (car registration, job application).

G Awareness of audience and management of complexity

Aware of the need to vary writing style according to the needs of specific audiences. Can write extended pieces of text. Conveys meaning accurately: not restricted by spelling, vocabulary or grammar. Uses a wide range of vocabulary, including technical, to convey accurate meaning. Moves correctly from first to third person. Uses both direct and indirect speech. Uses both personal and impersonal styles. Uses the passive voice. Can produce accurate and effective precis and summaries of text. Presents main and supporting ideas clearly. Conveys arguments through structuring of text using paragraphs to develop logical sequence. Can use complex sentence and discourse structure. Uses tense, grammar and punctuation accurately. Proof reads to check for ways to improve flow of ideas and style. Excludes irrelevant details and unnecessary phrases when editing.

H Variation in style; presenting sustained arguments

Produces a variety of styles using ideas, themes and models of structure from different sources. Develops and sustains written arguments. Organises ideas, justified with detail, in extended writing, using coherent long descriptions where needed. Writes extended pieces of text based on a range of varied reading material. Can incorporate idiom, colloquialisms and specific language requirements of different audiences. Provides clear interpretations of complex subjects. Provides written analysis of arguments and a clear outline of cause and effect. Constructs complex sentences in which ideas of secondary importance are in subordinate position. Writes reports making use of notes and summaries from a range of secondary and primary sources using standard means of referencing and quotation. Able to modify text type, style and register to suit audience requirements. Subtlety of meaning and stylistic conventions are incorporated in writing.

I Command of range in style and register

Selects text type according to the requirements of each occasion. Styles may include written conversations, reports, poems, plays, journals, diaries, academic writing. Manipulates elements of structure and style to produce stylistically original and individual writing. Irony, ambiguity and shades of meaning are used to convey complex ideas. Uses figures of speech such as analogy, metaphor and simile to describe, explain and/or illustrate. Descriptive passages reveal depth and breadth of personal resources. Expository writing reveals an extensive knowledge of discourse conventions and field vocabulary. Creative writing displays ability to generate original themes.

Appendix D

Numeracy : Basic Operations

A Count from memory to 5. Read and write numbers to 20. Order numbers 1 to 10. Count objects to 10. Identify sets with 1, 2 and 3 objects. Understand concept of 'more than', 'less than'. Associate quantity with numerals.

B Understand notion of direction. Understand/recognise even and odd numbers. Understand consecutive numbers. Understand notion of order. Count to twenty from any number. Understand numbers and relationships and the relative size of numbers. Add single digit numbers. Group objects by tens and ones. Arrange objects in groups to show one-more or one-less. Place whole numbers in ascending order. Read and write numbers to 100. Subtract single digit numbers. Recognise positions, second, third, fourth, fifth etc. Read and write number word names: one, two ... ten. Understand basic concepts of before, after.

C Read words: first, second, tenth. Add a 2-digit number to a 3-digit number. Round to the nearest unit ten, hundred etc. Double and halve numbers less than 100. Divide by a one digit number. Add a 1-digit number to a 2-digit number. Solve mixed addition and subtraction problems. Understand the relative size of numbers. Group 12 or fewer objects into equal parts. Count money. Add and subtract 2-digit numbers. Multiply single digit numbers. Subtract using numbers no larger than ten. Complete problems involving single-digit arithmetic. Write money amounts as 2 digit decimal.

D Use fractions (1/2, 1/3, 1/4) in everyday tasks. Add decimal fractions involving tenths. subtract any two numbers up to three digits. Solve an everyday number problem using a calculator. Identify and classify numeric symbols. Add numbers or numerals up to three digits. Multiply by two digit numbers. Demonstrate ability to differentiate, sort and classify information. Work out change for a familiar transaction accurately, quickly and confidently. Complete tasks involving mixtures of addition and subtraction. Divide a number with two decimal places by a whole number (e.g. find costs per item in dollars and cents). Perform computations of addition, subtraction, multiplication and division, including multiple operations, using whole numbers. Divide larger numbers by smaller ones. Multiply and divide by 10. Recognise that a whole is 100%. Identify the number before, after, or between two numbers.

E Arrange decimal numbers in ascending order. Round up or down to two decimal places. Calculate percentages using whole numbers. Use calculations to make comparisons. Subtract decimal numbers of up to two decimal places. Round whole numbers up or down as appropriate. Solve an everyday problem using estimation. Recognise the connection between a given percentage and the whole amount. Know up to 12 times tables. Complete basic calculations within one decimal place. Complete calculations where at least two operations are used. Understand place value, including decimals. Add decimal numbers including up to two decimal places. Know the meaning of equality and inequality signs.

F Recognise the appropriate operation to solve a problem/task. Understand/use common fractions. Perform mathematical operations using equipment such as a calculator, cash register, business machine and computer operated equipment. Carry out basic operations according to their correct order. Multiply numbers with at least two decimal places by a whole number (e.g. costs of multiple units given unit price). Solve an everyday problem using long division. Perform computations of addition, subtraction, multiplication and division, including multiple operations, using common or mixed numbers. Estimate and recognise the size of fractions of given objects. Estimate whether an answer to a mathematical problem makes sense. Check results of calculations. Perform simple mental estimates of percentage. Estimate and check sense of answers to calculations.Determine approximations by estimating, rounding off numbers and judging the correctness of the response.

G Compute averages. Divide decimal fractions by a whole number. Calculate percentage proportions of a whole. Apply a percentage in a context not involving money. Place fractions in ascending order. Add, subtract, multiply or divide two numbers with two decimal places. Understand that division by a fraction less than one results in a larger number. Use a percentage to determine amount of discount.

H Calculate one amount as a percentage of another. Perform multiple operations using mixed numbers including fractions. Compute with negative numbers (e.g. calculate range of temperature). Subtract common or mixed numbers including fractions. Multiply decimal fractions by a number with one decimal place. Identify the base for percentages. Convert between decimals and common fractions. Express a percentage as a decimal or a fraction. Convert common or mixed fractions to decimal fractions or percentages. Convert percentages to common, mixed or decimal fractions.

I Divide by a number with up to two decimal places without a calculator. Perform computations of addition, subtraction, multiplication and division, including multiple operations, using decimal fractions or percentages. Understand/use factors. Divide decimal fractions by a whole number. Use a calculator result in context. Calculate percentages in everyday descriptions from newspapers etc. Recognise equivalent fractions. Transpose simple formula. Divide common or mixed numbers.

J Calculate the circumference of any circle given the radius and a formula. Divide a set of objects according to a given ratio. Estimate an answer to a division by a decimal fraction. Simplify a given ratio. Compare ratios. Recognise equivalent fraction relationships. Create useful simple formulae. Estimate whether an answer to a mathematics problem makes sense. Understands and applies squares, cubes and other indices of numbers including square roots.

Appendix E

Numeracy : Measurement

A Distinguish between units of time: seconds, minutes, hours. Tell time to hour, half hour and quarter hour. Use common measurement instruments such as a ruler. Estimate time required for punctuality or task completion. Identify the names of the months of the year and the days of the week. Complete purchases of materials costing up to 50 cents. Distinguish between objects in terms of size. Place objects between, next to, behind, in front of, inside and outside. Write values of coins using the cent sign. Recognise money symbols, bank notes and coins in current use.

B Recognise simple geometric shapes in the environment (circle, square, rectangle, triangle). Estimate elapsed time within a 12-hour time frame. Identify fractional parts of shapes: halves, thirds, or fourths. Estimate costs and change for simple, common purchases. Compare same, more, and less (capacity). Interpret clock time (digital). Use common measurement instruments such as ruler, etc. Use a calendar system accurately. Interpret temperatures. Make rough estimate of travelling times. Identify or use information necessary to make or keep appointments. Understand amount of money needed for a particular transaction. Compare lighter and heavier (mass) objects. Estimate arrival and departure times for transport. Identify appropriate units with a 12/24 hour clock. Estimate change for simple purchases.

C Understand and have a sense of the concepts of decades, centuries and larger units of time. Interpret bills. Use time-planning skills such as estimates of time required for punctuality or task completion. Associate word names with circle, square, rectangle, and triangle. Calculate with units of time (e.g. using bus,plane and train schedules, use of time zones). Plan and budget for purchases. Calculate total costs based on item costs from catalogue. Use price or quality to determine the best buys for goods and services.

D Keep running estimate of purchases. Use the metric system to measure length. Use the metric system to measure weight. Convert between analog and digital clock and timer. Distinguish between perimeter, volume and area. Convert between a 12 and 24 hour clock. Formulate a personal budget. Work out change accurately, quickly and confidently. Read and interpret basic measurement and numerical readings on measurement instruments (e.g. ruler, kitchen scale, micrometer). Read appropriate measuring devices for temperature in Celsius. Calculate expenditure and change.

E Understand dimensions. Measure accurately in appropriate units. Estimate temperature in celsius units. Use a variety of units in the metric system to measure mass (gm, kg). Perform basic measurement tasks determining length, width, height, weight, including the use of conversion tables. Interpret the procedures and forms associated with banking services.

F Understand terms such as radius, diameter, width, depth, capacity. Compute an average from a given list of values. Interpret data given in a circle or pie graph. Estimate metric distances using appropriate units. Be aware of possible consequences of time frames and zones. Use the metric system to measure volume of solids. Interpret container weight and volume of contents. Interpret data given in a line or picture graph. Understand common prefix for metric measurement. Interpret data given in a bar graph. Construct simple pie charts and bar graphs. Use the metric length system with a variety of units (cm, mm). Use height and weight tables. Interpret scale drawings. Calculate the perimeter and area of rectangles given the lengths of its sides.

G Determine amount of interest charges on a loan. Calculate sales tax and other percentage computations. Use a protractor to measure angles accurately. Use the metric system to measure capacity. Use a variety of metric system units for capacity (m, L). Select, compute or interpret appropriate standard measurement for length, width, perimeter, area, volume, height or weight. Have a sense of size of standard units (L, m, ha, kilometre, 100°C). Estimate the area of everyday shapes (e.g. room size). Calculate the area of rectangles given the lengths of its sides. Use a variety of units in the metric system to measure volume (l, ml). Determine time changes across time zones (e.g. making STD calls etc). Estimate metric weight/mass using appropriate units. Demonstrate an appropriate unit for measurement depending on the size of the project. Compute mileage and petrol consumption.

H Use a mixture of units in the metric system to measure area (cm^2, ha). Recognise, use and measure linear dimensions, geometric shapes or angles. Measure area and volume of geometric shapes. Calculate volumes for everyday requirements. Interpret points of interest/features/areas/comparisons of graphs/charts/maps. Interpret interest on interest earning savings plans. Determine amount of interest charges on a loan. Select, compute or interpret appropriate standard measurement for length, width, perimeter, area, volume, height and weight.

Estimate metric capacity using appropriate units. Estimate metric area and volume using appropriate units. Understand gradients in graphs and in every day encounters.

I Convert between metric and imperial units of length, mass and volume. Estimate conversion from degrees to radians. Solve measurement problems in metric units using linear dimensions, area, volume, weights, geometric shapes and angles. Measure area and volume of geometric shapes. Estimate metric volume using appropriate units. Use compass points for cross referencing. Convert between Fahrenheit and Celsius /centigrade temperature scales. Calculate the area of a circle of any radius given an appropriate formula. Interpret and develop drawings to scale in everyday situations.

Appendix F

Numeracy : Quantitative Information Processing

A Time and Basic Numerical Value

State days of the week in order. Interpret digital clock time. Use calendar skills: dates, days, months. State months in order. Understand relevance of dates on calendar. Select a group of objects to show a number less than 10. State days of the week in order. Identify individual coins. Distinguish between objects in terms of size. Read symbols as having meanings.

B Order, Changes and Scales of Measure

Recognise groups with more than, less than, and same as. Interpret clothing and pattern sizes. Identify relationships between columns and rows in tables. Recognise positions, first, second, third, fourth etc. Identify relationships between columns and rows in tables. Identify information necessary to make or keep appointments. Sequence daily activities in order of time due to be done. Interpret temperatures. Match numerals to written word. Place objects between, next to, behind, in front of, inside and outside. Recognise words and phrases that are used with mathematical interpretations (e.g. increasingly, recently, rising/falling, included/excluded).

C Common Relationships and Operations

Compare different methods used to purchase goods and services. Operate a savings bank account independently. Calculate with simple units of time. Have an understanding of the relationship between mathematics and its applications. Read and interpret a travel schedule. Compare price or quality to determine the best buys for goods and services. Interpret information about using a pay telephone. Group objects by two or more characteristics. Calculate and total costs based on item costs from catalogue. Interpret restaurant menus and compute related costs. Determine a 10% tip given the amount of a bill. Interpret bills. Work out change accurately, quickly and confidently. Read and interpret a T.V. timetable. Understand whole numbers and decimals when using the calculator.

D Planning and Organising with Quantitative Information

Interpret information about personal and family budgets. Formulate a personal budget. Plan travel arrangements using bus/train/flight schedule. Solve problems involving addition and subtraction. Estimate and check sense of answers to calculations. Understand pricing discounts. Plan and budget for major purchases. Use height and weight tables. Construct a simple budget. Construct a simple graph to represent data to others. Demonstrate the use of savings and cheque accounts. Demonstrate ability to organise time and set priorities for personal, educational and workplace responsibilities. Use maps relating to meet travel needs. Use catalogues, order forms and related information to purchase goods and services. Interpret scale drawings of common objects. Recognise common mathematical words embedded in text.

E Interpretation and Analysis

Interpret data given in a bar graph. Locate a point on a road map. Read/interpret road maps, street directories accurately/easily. Read headings and footnotes to check definitions of terms and restrictions on data presented in graph/tabular form. Demonstrate ability to differentiate, sort and classify information. Interpret statistical information used in news reports and articles. Understand certainty, probabilities, impossibility. Understand social concepts (e.g. inflation, enlargement, speed). Use appropriate banking and financial systems for a range of transactions. Interpret data given in a circle or pie graph. Investigate best price for goods (e.g. by phoning or searching ads). Identify information from a graph depicting two kinds of information as time (e.g. year) and quantity (e.g. population). Interpret data given in a line graph.

F Evaluate and Apply Numerical Information

Understand and use scales of comparisons and relationships. Understand pricing discounts. Identify appropriate operations needed for common problem solving. Compute mileage and petrol consumption of a car. Interpret scale drawings of common objects. Demonstrate ability to apply or transfer skills learned in one context to another. Read and interpret timetables, charts, graphs. Check solutions to mathematical everyday problems to see if they are realistic. Compute an average from a given list of data. Compute averages. Understand and interpret data (e.g. statistics, graphs). Interpret graphs in daily newspaper. Construct a graph to represent data to others. Translate a calculator result back into its setting. Select the most appropriate method of recording information and present it visually. Demonstrate ability to differentiate, sort and classify

complex information. Use or create memory devices and visual images for remembering information. Read and interpret timetables, charts, graphs. Solve problems and arrive at decisions as a team member in a work setting.

G Extract and Manipulate Numerical Information

Substitute one number into a formula and check the result. File information systematically so that a specific item can be located. Understand and use scales of comparisons and relationships. Interpret information about time-zones. Interpret information about car insurance. Interpret data from a range of graph types (e.g. line, bar, picture and circle graphs). Attempt non-routine problems including calculations. Interpret statements of probability. Compute or determine sales tax. Interpret ratio and proportion (e.g. preparing mixtures, figuring pay rate). Understand the nature of mathematical arguments. Decide which situations would be enhanced by a graph/line representation. Interpret information related to the selection and purchase of an object involving large expenditure (e.g. a car). Use an appropriate equation to solve a practical problem. Select the most appropriate method of recording information and present it visually. Determine frequencies from a set of data and display them on a histogram.

H Insight, Inference and Critical Skills

Transpose simple formula. Make appropriate judgements about the quality and appropriateness of data collection and presentation. Substitute numerical values into an expression, and then manipulate the numerical expression to determine the unknown variable. Identify appropriate operation for a specific task using appropriate units and measuring equipment. Make diagrammatic representation of mathematical relationships. Identify effective problem-solving strategies such as formulating, evaluating and choosing options. Use computation short cuts. Demonstrate critical skills when viewing statistical information. Draw conclusions and make predictions based on data and principles of chance (e.g. weather prediction, gambling, risk insurance). Express ideas using mathematical symbols.

I Numerical Reasoning and Inquiry

Know the assumptions that underlie predictions and procedures in mathematics. Recognise relationships of geometrical shapes and make use of these to solve practical problems. Estimate spatially in order to locate a given point within a grid. Access critically ideas and arguments which involve mathematical concepts or are presented in mathematical form. Use a range of strategies for formulating problems into mathematical terms and for checking and interpreting answers. Deal with quantitative arguments about social and psychological phenomena which involve mathematics. Interpret information on financial agencies and financial planning. Represent, explain and predict in mathematics. Interpret information about the types of loans available through lending institutions. Understand the relationship between assumptions and conclusions in mathematics. Validly question the assumptions underlying data collection, analysis, interpretation, results and conclusion, presented in the media.

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